```
DDDDDDDDDDD     EEEEEEEEEEEEEEE  BBBBBBBBBBB      UUU         UUU     GGGGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUU         UUU     GGGGGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUU         UUU     GGGGGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG
DDD         DDD EEEEEEEEEEE      BBBBBBBBBBBB     UUU         UUU GGG
DDD         DDD EEEEEEEEEEE      BBBBBBBBBBBB     UUU         UUU GGG
DDD         DDD EEEEEEEEEEE      BBBBBBBBBBBB     UUU         UUU GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG    GGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG    GGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG    GGGGGGGGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG          GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG          GGG
DDD         DDD EEE              BBB         BBB  UUU         UUU GGG          GGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUUUUUUUUUUUUUUU    GGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUUUUUUUUUUUUUUU    GGGGGGGGG
DDDDDDDDDDDD    EEEEEEEEEEEEEEE  BBBBBBBBBBBB     UUUUUUUUUUUUUUUU    GGGGGGGGG
```

FILEID**RSTACCESS

```
RRRRRRRR      SSSSSSSS  TTTTTTTTTT    AAAAAA     CCCCCCCC   CCCCCCCC  EEEEEEEEEE    SSSSSSSS   SSSSSSSS
RRRRRRRR      SSSSSSSS  TTTTTTTTTT    AAAAAA     CCCCCCCC   CCCCCCCC  EEEEEEEEEE    SSSSSSSS   SSSSSSSS
RR      RR  SS            TT       AA      AA  CC         CC         EE            SS         SS
RR      RR  SS            TT       AA      AA  CC         CC         EE            SS         SS
RR      RR  SS            TT       AA      AA  CC         CC         EE            SS         SS
RR      RR  SS            TT       AA      AA  CC         CC         EE            SS         SS
RRRRRRRR      SSSSSS        TT       AA      AA  CC         CC         EEEEEEEE      SSSSSS     SSSSSS
RRRRRRRR      SSSSSS        TT       AA      AA  CC         CC         EEEEEEEE      SSSSSS     SSSSSS
RR  RR              SS      TT       AAAAAAAAAA  CC         CC         EE                  SS         SS
RR  RR              SS      TT       AAAAAAAAAA  CC         CC         EE                  SS         SS
RR    RR            SS      TT       AA      AA  CC         CC         EE                  SS         SS      ....
RR    RR            SS      TT       AA      AA  CC         CC         EE                  SS         SS      ....
RR      RR  SSSSSSSS      TT       AA      AA    CCCCCCCC   CCCCCCCC  EEEEEEEEEE  SSSSSSSS   SSSSSSSS      ....
RR      RR  SSSSSSSS      TT       AA      AA    CCCCCCCC   CCCCCCCC  EEEEEEEEEE  SSSSSSSS   SSSSSSSS      ....

LL              IIIIII      SSSSSSSS
LL              IIIIII      SSSSSSSS
LL                II      SS
LL                II      SS
LL                II      SS
LL                II      SS
LL                II        SSSSSS
LL                II        SSSSSS
LL                II              SS
LL                II              SS
LL                II              SS
LL                II              SS
LLLLLLLLLL      IIIIII    SSSSSSSS
LLLLLLLLLL      IIIIII    SSSSSSSS
```

```
;     1          0001  0 MODULE RSTACCESS (IDENT = 'V04-000') =
;     2          0002  0
;     3          0003  1 BEGIN
;     4          0004  1
;     5          0005  1 !**********************************************************************
;     6          0006  1 !*                                                                    *
;     7          0007  1 !*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                          *
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;    15          0015  1 !*  OTHER PERSON.  NO TITLE TO AND OWNERSHIP OF  THE  SOFTWARE IS  HEREBY  *
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;    21          0021  1 !*                                                                    *
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;    23          0023  1 !*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.            *
;    24          0024  1 !*                                                                    *
;    25          0025  1 !*                                                                    *
;    26          0026  1 !**********************************************************************
;    27          0027  1 !
;    28          0028  1 ! WRITTEN BY
;    29          0029  1 !       Bert Beander    June, 1980.
;    30          0030  1 !
;    31          0031  1 ! MODULE FUNCTION
;    32          0032  1 !       This module contains most of the Symbol Table Access routines (except
;    33          0033  1 !       for the type routines in module RSTTYPES) that the language-specific
;    34          0034  1 !       routines call to look up symbols in the Debug Symbol Table and to
;    35          0035  1 !       extract symbol table information about those symbols.
;    36          0036  1 !
;    37          0037  1 ! MODIFIED BY
;    38          0038  1 !       Ping Sager
;    39          0039  1 !       Rich Title
;    40          0040  1 !       Vicki Holt
;    41          0041  1 !       Walter Carrell III
;    42          0042  1 !
;    43          0043  1
;    44          0044  1 REQUIRE 'SRC$:DBGPROLOG.REQ';
;    45          0178  1
;    46          0179  1 LIBRARY 'LIB$:DBGGEN.L32';
;    47          0180  1
;    48          0181  1 FORWARD ROUTINE
;    49          0182  1     DBG$ADDRESS_STRING,                 ! Returns ASCII encoding of an address
;    50          0183  1     DBG$BUILD_INVOC_RST,                ! Build Invocation Number RST Entry
;    51          0184  1     DBG$GET_OUTER_REC_ADDRESS,          ! Get the outer record's start address from the primary
;    52          0185  1                                         ! pointed to by DBG$GL_CURRENT_PRIMARY
;    53          0186  1     DBG$GET_INNER_REC_ADDRESS,          ! Get the inner record's start address from the primary
;    54          0187  1                                         ! pointed to by DBG$GL_CURRENT_PRIMARY
;    55          0188  1     DBG$IS_IT_ENTRY,                    ! See if an address is an entry point
;    56          0189  1     DBG$RST_SHOWSCOPE:  NOVALUE,        ! Handle the SHOW SCOPE command
;    57          0190  1     DBG$RST_TEMP_RELEASE: NOVALUE,      ! Release all temporary RST entries
```

```
;    58          0191  1                                  !       which are not locked
;    59          0192  1      DBG$STA_ADDRESS_TO_REGDESCR,  ! Converts an absolute address to a
;    60          0193  1                                  !       Register Descriptor (or zero)
;    61          0194  1      DBG$STA_GETSOURCEMOD,         ! Get Module RST pointer to use for
;    62          0195  1                                  !       source line display
;    63          0196  1      DBG$STA_GETSYMBOL:  NOVALUE,  ! Convert pathname to a symbol
;    64          0197  1      DBG$STA_GETSYMOFF,            ! Convert address to symbol and offset
;    65          0198  1      DBG$STA_LINE_NUM_RST,         ! Build a Line Number RST Entry
;    66          0199  1      DBG$STA_LOCK_SYMID: NOVALUE,  ! Lock an RST entry in RST memory
;    67          0200  1      DBG$STA_LOOKUP_GBL,           ! Look up a symbol in the image's Global
;    68          0201  1                                  !       Symbol Table (the GST)
;    69          0202  1      DBG$STA_NOEVALBIT,            ! See if the NOEVAL bit is set in a
;    70          0203  1                                  !       symbol's value spec.
;    71          0204  1      DBG$STA_NUMBERED_SCOPE: NOVALUE,  ! Find "numbered" scope from PC in stack
;    72          0205  1      DBG$STA_RECORD_COMPONENT,     ! Returns SYMID of N-th record component
;    73          0206  1      DBG$STA_RECORD_INDEX,         ! Returns index of a record component
;    74          0207  1      DBG$STA_REGISTER_NAME,        ! Generates print name for a register
;    75          0208  1      DBG$STA_SAME_DST_OBJECT,      ! See if two SYMIDs refer to same DST
;    76          0209  1      DBG$STA_SETCONTEXT: NOVALUE,  ! Set up context for value evaluation
;    77          0210  1      DBG$STA_SETREGISTERS: NOVALUE,  ! Set register values back in save areas
;    78          0211  1      DBG$STA_SYM_IS_LITERAL,       ! See if symbol is a literal value
;    79          0212  1      DBG$STA_SYMKIND:    NOVALUE,  ! Get a symbol's kind
;    80          0213  1      DBG$STA_SYMNAME:    NOVALUE,  ! Get a symbol's name
;    81          0214  1      DBG$STA_SYMPARENT,            ! Get parent SYMID for a data component
;    82          0215  1      DBG$STA_SYMPATHNAME: NOVALUE,  ! Get a symbol's full pathname
;    83          0216  1      DBG$STA_SYMVALUE:   NOVALUE,  ! Get a symbol's value or address
;    84          0217  1      DBG$STA_UNLOCK_SYMID: NOVALUE,  ! Unlock an RST entry lock in RST memory
;    85          0218  1      DBG$STA_VALSPEC:    NOVALUE,  ! Evaluate a DST Value Spec
;    86          0219  1      DBG$STA_VARIANT_SELECT,       ! Return variant entry given tag value
;    87          0220  1      DBG$STA_VARIANT_VALUE,        ! See if tag variable value matches a
;    88          0221  1                                  !       specified record variant
;    89          0222  1      DBG$TEST_ROUTINE_CALL,        ! Routine to be called for testing stack machine routine calls
;    90          0223  1      DBG$TRANS_TO_REGNAME,         ! Translates address of register
;    91          0224  1      ADD_TO_REF_COUNT:   NOVALUE,  ! Increment or decrement RST entry ref-
;    92          0225  1                                  !       erence count
;    93          0226  1      CHECK_DUPLICATE,              ! Check for duplicate RST Entry
;    94          0227  1      EVAL_MAT_SPEC:      NOVALUE,  ! Evaluate a Materialization Spec
;    95          0228  1      FOLLOW_STATIC_LINK,           ! Follow static links through call stack
;    96          0229  1                                  !       for up-level addressing
;    97          0230  1      GET_RECORD_ADDRESS,           ! Get a record start address
;    98          0231  1      GET_REGISTER_SYMID,           ! Returns SYMID or 0 for register name
;    99          0232  1      GET_REGISTER_VALUES: NOVALUE,  ! Get register values from the current
;   100          0233  1                                  !       CALL frame
;   101          0234  1      SCOPE_RULE_COBOL,             ! Select candidate symbol using COBOL
;   102          0235  1                                  !       scope rules
;   103          0236  1      SCOPE_RULE_NORMAL,            ! Select candidate symbol using "normal"
;   104          0237  1                                  !       scope rules
;   105          0238  1      SCOPE_RULE_PLI,               ! Select candidate symbol using PL/I
;   106          0239  1                                  !       scope rules
;   107          0240  1      SETCONTEXT_ERROR_HANDLER,     ! Error handler for DBG$STA_SETCONTEXT
;   108          0241  1      STACK_MACHINE: NOVALUE,       ! Value Spec stack machine interpreter
;   109          0242  1      VALSPEC_ERROR_HANDLER,        ! Error handler for DBG$STA_VALSPEC
;   110          0243  1      VALSPEC_SCOPE_ERROR: NOVALUE,  ! Value Spec scope error routine
;   111          0244  1      VALSPEC_ROUT_CALL:  NOVALUE,  ! Do routine call on a compiler-supplied
;   112          0245  1                                  !       routine for Value Spec evaluation
;   113          0246  1      VALSPEC_ROUT_CALL_HANDLER;    ! A handler to catch the abnormal
;   114          0247  1                                  !       status for VALSPEC_ROUT_CALL
```

```
;  116     0248  1 EXTERNAL ROUTINE
;  117     0249  1     DBG$COPY_MEMORY,                        ! Create a new copy of a memory block
;  118     0250  1     DBG$GET_DST_NAME,                       ! Get the ASCII name from a DST record
;  119     0251  1     DBG$GET_MEMORY,                         ! Get a permanent memory block
;  120     0252  1     DBG$GET_TEMPMEM,                        ! Get a "temporary" memory block
;  121     0253  1     DBG$HASH_FIND,                          ! Find a name in the RST hash table
;  122     0254  1     DBG$HASH_FIND_SETUP:NOVALUE,            ! Set up calls on HASH_FIND routine
;  123     0255  1     DBG$HASH_INSERT:    NOVALUE,            ! Insert an RST entry in hash table
;  124     0256  1     DBG$LINE_TO_PC_LOOKUP,                  ! Look up the PC for a given line number
;  125     0257  1     DBG$NCOPY_DESC,                         ! Copy a primary descriptor
;  126     0258  1     DBG$NEWLINE: NOVALUE,                   ! Flush current print line
;  127     0259  1     DBG$NGET_RADIX,                         ! Returns present radix
;  128     0260  1     DBG$NPATHDESC_TO_CS:NOVALUE,            ! Generate pathname ASCII string from a
;  129     0261  1                                             !     pathname descriptor
;  130     0262  1     DBG$PC_TO_LINE_LOOKUP,                  ! Look up a line number given a PC addr
;  131     0263  1     DBG$PRIM_TO_VAL,                        ! Convert a primary to a value
;  132     0264  1     DBG$PRINT: NOVALUE,                     ! Print some ASCII text
;  133     0265  1     DBG$PRINT_CONTROL,                      ! Set up print controls
;  134     0266  1     DBG$REL_MEMORY:     NOVALUE,            ! Release a memory block to memory pool
;  135     0267  1     DBG$RST_BUILD:      NOVALUE,            ! Build the RST for a specified module
;  136     0268  1     DBG$RST_MOST_RECENT:NOVALUE,            ! Mark a module as being the Most
;  137     0269  1                                             !     Recently Referenced module
;  138     0270  1     DBG$SEARCH_GLOBAL,                      ! Tries to symbolize virtual address by
;  139     0271  1                                             !     searching global symbol chain
;  140     0272  1     DBG$SEARCH_SAT,                         ! Tries to symbolize virtual address by
;  141     0273  1                                             !     searching SAT.
;  142     0274  1     DBG$SEARCH_VAX_CALL_STACK,              ! Tries to symbolize virtual address by
;  143     0275  1                                             !     searching through call stack.
;  144     0276  1     DBG$STA_SYMTYPE :   NOVALUE,            ! Get TYPE of Data Item
;  145     0277  1     DBG$STA_TYP_ARRAY : NOVALUE,            ! Return information about arrays
;  146     0278  1     DBG$STA_TYPEFCODE,                      ! Obtain fcode from SYMID
;  147     0279  1     DBG$SYMBOLIZE_REG,                      ! Finds symbols bound to specified register.
;  148     0280  1     SYS$FAO: ADDRESSING_MODE (ABSOLUTE);    ! System service for formatting output
;  149     0281  1
;  150     0282  1 EXTERNAL
;  151     0283  1     DBG$FINAL_HANDL,                        ! Call frame exception handler--used
;  152     0284  1                                             !     searching for a numeric scope
;  153     0285  1     DBG$GB_MOD_PTR: REF VECTOR[,BYTE],      ! Current mode setting
;  154     0286  1     DBG$GB_LANGUAGE: BYTE,                  ! The currently SET language code
;  155     0287  1
;  156     0288  1     DBG$GB_NO_GLOBALS: BYTE,                ! Number of global symbols in the GST
;  157     0289  1     DBG$GB_VERB: BYTE,                      ! Holds command verb
;  158     0290  1     DBG$GL_CMND_RADIX,                      ! Radix to use for EXAMINE
;  159     0291  1     DBG$GL_CURRENT_PRIMARY,                 ! Pointer to the primary being processed
;  160     0292  1     DBG$GV_CONTROL : DBG$CONTROL_FLAGS,     ! DEBUG control bits
;  161     0293  1     DBG$RUNFRAME: BLOCK[,BYTE],             ! The current user run frame
;  162     0294  1     DBG$PSEUDO_EXIT,                        ! Point to which CALL command CALL re-
;  163     0295  1                                             !     turns--used to find numeric scope
;  164     0296  1     DST$BEGIN_ADDR,                         ! Virtual address where the DST begins
;  165     0297  1     DST$END_ADDR,                           ! Virtual address of last byte of DST
;  166     0298  1     LRUM$MOST_RECENT,                       ! Pointer to the RST entry of the Most
;  167     0299  1                                             !     Recently Referenced module
;  168     0300  1     RST$REF_LIST: REF VECTOR[,LONG],        ! Pointer to list of RST entries refer-
;  169     0301  1                                             !     enced by current Debug command
;  170     0302  1     RST$TEMP_LIST,                          ! Pointer to Temporary RST Entry List
;  171     0303  1     DBG$REG_VALUES: VECTOR[,LONG],          ! Vector of user register values in the
;  172     0304  1                                             !     current context
```

```
;  173          0305  1      DBG$REG_VECTOR: VECTOR[,LONG],          ! Vector of pointers to user register
;  174          0306  1                                              !      save locations in current context
;  175          0307  1      RST$SET_SCOPE,                          ! Set if called from DBG$RST_SETSCOPE
;  176          0308  1      RST$START_ADDR: REF RST$ENTRY,          ! Pointer to first Module RST Entry
;  177          0309  1      SAT$START_ADDR,                         ! Address of first Static Address Table
;  178          0310  1                                              !      (SAT) entry on Program SAT chain
;  179          0311  1      SCOPE$LIST;                             ! Pointer to first Scope List entry
;  180          0312  1
;  181          0313  1  OWN
;  182          0314  1      DBG$REG_SCOPE: INITIAL(0),              ! Numeric scope for context register
;  183          0315  1      DBG$REG_SYMID: INITIAL(0),              ! SYMID used to set the current context
;  184          0316  1      DBG$SCOPE_NUMBER: INITIAL(0);           ! Scope number for current context set
;  185          0317  1                                              !      by routine DBG$STA_SETCONTEXT
;  186          0318  1
;  187          0319  1
;  188          0320  1  ! Field definitions and declaration macro for the "candidate block" block-vector
;  189          0321  1  ! used by DBG$STA_GETSYMBOL and the SCOPE_RULE_xxx routines.
;  190          0322  1  !
;  191          0323  1  FIELD CAND_FLD_DEF =
;  192          0324  1      SET
;  193          0325  1      CAND_RSTPTR = [ 0, L_ ],                ! Pointer to symbol's RST entry
;  194          0326  1      CAND_PINDEX = [ 1, L_ ]                 ! Pathname vector index + 1 for symbol
;  195          0327  1      TES;
;  196          0328  1
;  197          0329  1  LITERAL
;  198          0330  1      CAND_ENTSIZ = 2;                        ! Longword size of a candidate entry
;  199          0331  1
;  200          0332  1  MACRO
;  201          0333  1      CAND_BLOCKVECTOR = BLOCKVECTOR[,CAND_ENTSIZ,LONG] FIELD(CAND_FLD_DEF) %;
;  202          0334  1
;  203          0335  1  LITERAL
;  204          0336  1      Outer = 1,                                      ! Flag value for GET_RECORD_ADDRESS to return the outer reco
;  205          0337  1      Inner = 2;                                      ! Flag value for GET_RECORD_ADDRESS to return the inner reco
;  206          0338  1
;  207          0339  1  !++
;  208          0340  1  ! This is a test DST used to test DBG$GET_OUTER_REC_ADDRESS
;  209          0341  1  ! and DBG$GET_INNER_REC_ADDRESS. To use it, you use the SUPER
;  210          0342  1  ! DEBUGGER to put the address of the test record in place of
;  211          0343  1  ! the address of the record you've asked for in DBG$STA_VALSPEC.
;  212          0344  1  ! Thus, fooling the debugger into using the test record.
;  213          0345  1  !--
;  214          0346  1  GLOBAL BIND
;  215          0347  1      DBG$TEST_DST = UPLIT BYTE (
;  216          0348  1          DST$K_VS_FOLLOWS,
;  217          0349  1          WORD(-11),
;  218          0350  1          DST$K_VS_ALLOC_DYN,
;  219          0351  1          DST$K_MS_BYTADDR,
;  220          0352  1          DST$K_MS_MECH_STK,
;  221          0353  1          0,
;  222          0354  1          DST$K_STK_PUSHIML,
;  223          0355  1          LONG(DBG$TEST_ROUTINE_CALL),
;  224          0356  1          DST$K_STK_RTNCALL,
;  225          0357  1          DST$K_STK_STOP);
;  226          0358  1
```

```
;  228          0359  1 GLOBAL ROUTINE DBG$ADDRESS_STRING (ADDRESS_DESC) =
;  229          0360  1 !
;  230          0361  1 ! FUNCTION
;  231          0362  1 !       This routine accepts an address descriptor and converts the contained
;  232          0363  1 !       virtual address (within the address descriptor), ignoring offset, to a
;  233          0364  1 !       counted ASCII string, the address of which is returned as the routine
;  234          0365  1 !       value. If the address is in the Debugger's register save area, the
;  235          0366  1 !       corresponding register name is returned in the counted string. Otherwise,
;  236          0367  1 !       the address is returned as a numeric string in the proper radix. If a
;  237          0368  1 !       register name is returned, it is preceded by the corresponding scope
;  238          0369  1 !       number, for example, '2\%R5' for register R5 in the scope two call frames
;  239          0370  1 !       down in the stack. For the top call frame, the scope number is zero. The
;  240          0371  1 !       scope number is determined by the last call to DBG$STA_SETCONTEXT.
;  241          0372  1 !
;  242          0373  1 !       This routine gets the current scope number from the global symbol
;  243          0374  1 !       DBG$REG_SCOPE which set up by DBG$STA_SETCONTEXT.  It also uses the
;  244          0375  1 !       global symbols DBG$GB_VERB (which points to the current command being
;  245          0376  1 !       processed) and DBG$GL_CMND_RADIX (the radix in effct for an EXAMINE\
;  246          0377  1 !       command) to determine the appropriate radix to use.
;  247          0378  1 !
;  248          0379  1 ! INPUTS
;  249          0380  1 !       ADDRESS_DESC    - A longword containing the address of an address
;  250          0381  1 !                         descriptor of a VAX virtual address.
;  251          0382  1 !
;  252          0383  1 ! OUTPUTS
;  253          0384  1 !       The address of a counted ASCII string representing the input address
;  254          0385  1 !               is returned as the routine value.
;  255          0386  1 !
;  256          0387  1
;  257          0388  2     BEGIN
;  258          0389  2
;  259          0390  2     MAP
;  260          0391  2         ADDRESS_DESC: REF DBG$ADDRESS_DESC;  ! Pointer to input address descr.
;  261          0392  2
;  262          0393  2     LOCAL
;  263          0394  2         RADIX,                              ! Radix to use for output
;  264          0395  2         CONTROL_DESC: BLOCK [8,BYTE],       ! $FAO control block
;  265          0396  2         FAO_LENGTH: WORD,                   ! $FAO output length
;  266          0397  2         OUTPUT_DESC: BLOCK [8,BYTE],        ! Output descriptor
;  267          0398  2         OUTPUT_BUFFER: REF VECTOR [,BYTE];  ! Output buffer
;  268          0399  2
;  269          0400  2
;  270          0401  2
;  271          0402  2     ! Check to see if address can be resymbolized to a register.
;  272          0403  2     !
;  273          0404  2     IF DBG$TRANS_TO_REGNAME (.ADDRESS_DESC [DBG$L_ADDRESS_BYTE_ADDR],
;  274          0405  2                              OUTPUT_BUFFER)
;  275          0406  2     THEN
;  276          0407  2         RETURN .OUTPUT_BUFFER;
;  277          0408  2
;  278          0409  2
;  279          0410  2     ! Register resymbolization not possible. Check to determine what radix to
;  280          0411  2     ! use and set up for FAO call.
;  281          0412  2     !
;  282          0413  2     IF .DBG$GB_VERB EQL DBG$K_EXAMINE_VERB
;  283          0414  2     THEN
;  284          0415  3         BEGIN
```

```
;  285          0416  3          RADIX = .DBG$GL_CMND_RADIX;
;  286          0417  3          IF .RADIX EQL DBG$K_DEFAULT
;  287          0418  3          THEN
;  288          0419  3              RADIX = DBG$NGET_RADIX();
;  289          0420  3          END
;  290          0421  2      ELSE
;  291          0422  2          RADIX = DBG$NGET_RADIX();
;  292          0423  2
;  293          0424  2      CONTROL_DESC [DSC$A_POINTER] = (
;  294          0425  3          CASE .RADIX FROM DBG$K_DEFAULT TO DBG$K_HEX OF
;  295          0426  3              SET
;  296          0427  3
;  297          0428  3              ! Octal radix.  Edit the address into ASCII octal.
;  298          0429  3              !
;  299          0430  3              [DBG$K_OCTAL]:
;  300          0431  4                  BEGIN
;  301          0432  4                  CONTROL_DESC [DSC$W_LENGTH] = %CHARCOUNT ('!OL');
;  302          0433  4                  UPLIT BYTE ('!OL')
;  303          0434  4                  END;
;  304          0435  3
;  305          0436  3              ! Hexadecimal radix.  Edit the address into hexadecimal.
;  306          0437  3              !
;  307          0438  3              [DBG$K_HEX]:
;  308          0439  4                  BEGIN
;  309          0440  4                  CONTROL_DESC [DSC$W_LENGTH] = %CHARCOUNT ('!XL');
;  310          0441  4                  UPLIT BYTE ('!XL')
;  311          0442  4                  END;
;  312          0443  3
;  313          0444  3              ! Use decimal radix for all other cases.  Edit the address into
;  314          0445  3              ! decimal ASCII.
;  315          0446  3              !
;  316          0447  3              [INRANGE, OUTRANGE]:
;  317          0448  4                  BEGIN
;  318          0449  4                  CONTROL_DESC [DSC$W_LENGTH] = %CHARCOUNT ('!UL');
;  319          0450  4                  UPLIT BYTE ('!UL')
;  320          0451  4                  END;
;  321          0452  3
;  322          0453  3              TES);
;  323          0454  2
;  324          0455  2
;  325          0456  2      ! Get some storage for the string.
;  326          0457  2      !
;  327          0458  2      OUTPUT_BUFFER = DBG$GET_TEMPMEM(5);
;  328          0459  2
;  329          0460  2      ! Call $FAO to do the formatting.
;  330          0461  2      !
;  331          0462  2      OUTPUT_DESC [DSC$W_LENGTH] = (5 * %UPVAL) - 2;
;  332          0463  2      OUTPUT_DESC [DSC$A_POINTER] = OUTPUT_BUFFER [2];
;  333          0464  2      IF NOT SYS$FAO (CONTROL_DESC,
;  334          0465  2                      FAO_LENGTH,
;  335          0466  2                      OUTPUT_DESC,
;  336          0467  2                      .ADDRESS_DESC [DBG$L_ADDRESS_BYTE_ADDR])
;  337          0468  2      THEN
```

```
;  342          0473  2          $DBG_ERROR('RSTACCESS\ADDRESS_STRING');
;  343          0474  2
;  344          0475  2
;  345          0476  2      ! The string is formatted, but we want to insert a leading '0' for HEX
;  346          0477  2      ! when the first character is A, B, C, D, E, or F.
;  347          0478  2      !
;  348          0479  2      IF .RADIX EQL DBG$K_HEX
;  349          0480  2      THEN
;  350          0481  3          BEGIN
;  351          0482  3          IF .OUTPUT_BUFFER [2] GTR '9'
;  352          0483  3          THEN
;  353          0484  4              BEGIN
;  354          0485  4              OUTPUT_BUFFER [1] = '0';
;  355          0486  4              OUTPUT_BUFFER [0] = .FAO_LENGTH + 1;
;  356          0487  4              RETURN OUTPUT_BUFFER [0];
;  357          0488  3              END;
;  358          0489  3
;  359          0490  2          END;
;  360          0491  2
;  361          0492  2
;  362          0493  2      ! Just return what $FAO formatted.
;  363          0494  2      !
;  364          0495  2      OUTPUT_BUFFER [1] = .FAO_LENGTH;
;  365          0496  2      RETURN OUTPUT_BUFFER [1];
;  366          0497  2
;  367          0498  1      END;


                                                        .TITLE  RSTACCESS
                                                        .IDENT  \V04-000\

                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                                                 FD  00000 P.AAA:   .BYTE   -3                                          ;
                                               000B  00001          .WORD   11                                          ;
                                      12  00   02  01   02  00003          .BYTE   2, 1, 2, 0, 18                       ;
                                           00000000V  00008          .ADDRESS DBG$TEST_ROUTINE_CALL                     ;
                                                 17   28  0000C          .BYTE   40, 23                               ;
                                             4C  4F   21  0000E P.AAB:   .ASCII  \!OL\                                ;
                                             4C  58   21  00011 P.AAC:   .ASCII  \!XL\                                ;
                                             4C  55   21  00014 P.AAD:   .ASCII  \!UL\                                ;
52  44  44  41  5C  53  53  45  43  43  41  54  53  52   18  00017 P.AAE:   .ASCII  <24>\RSTACCESS\<92>\ADDRESS_STRING\  ;
                    47  4E  49  52  54  53  5F  53  53   45  00026

                                                        .PSECT  DBG$OWN,NOEXE,  PIC,2

                                           00000000  00000 DBG$REG_SCOPE:
                                                        .LONG   0                                                       ;
                                           00000000  00004 DBG$REG_SYMID:
                                                        .LONG   0                                                       ;
                                           00000000  00008 DBG$SCOPE_NUMBER:
                                                        .LONG   0                                                       ;

                                                 DBG$TEST_DST==      P.AAA
                                                        .EXTRN  DBG$COPY_MEMORY
                                                        .EXTRN  DBG$GET_DST_NAME
                                                        .EXTRN  DBG$GET_MEMORY, DBG$GET_TEMPMEM
```

```
                .EXTRN  DBG$HASH_FIND, DBG$HASH_FIND_SETUP
                .EXTRN  DBG$HASH_INSERT
                .EXTRN  DBG$LINE_TO_PC_LOOKUP
                .EXTRN  DBG$NCOPY_DESC, DBG$NEWLINE
                .EXTRN  DBG$NGET_RADIX, DBG$NPATHDESC_TO_CS
                .EXTRN  DBG$PC_TO_LINE_LOOKUP
                .EXTRN  DBG$PRIM_TO_VAL
                .EXTRN  DBG$PRINT, DBG$PRINT_CONTROL
                .EXTRN  DBG$REL_MEMORY, DBG$RST_BUILD
                .EXTRN  DBG$RST_MOST_RECENT
                .EXTRN  DBG$SEARCH_GLOBAL
                .EXTRN  DBG$SEARCH_SAT, DBG$SEARCH_VAX_CALL_STACK
                .EXTRN  DBG$STA_SYMTYPE
                .EXTRN  DBG$STA_TYP_ARRAY
                .EXTRN  DBG$STA_TYPEFCODE
                .EXTRN  DBG$SYMBOLIZE_REG
                .EXTRN  SYS$FAO, DBG$FINAL_HANDL
                .EXTRN  DBG$GB_MOD_PTR, DBG$GB_LANGUAGE
                .EXTRN  DBG$GB_NO_GLOBALS
                .EXTRN  DBG$GB_VERB, DBG$GL_CMND_RADIX
                .EXTRN  DBG$GL_CURRENT_PRIMARY
                .EXTRN  DBG$GV_CONTROL, DBG$RUNFRAME
                .EXTRN  DBG$PSEUDO_EXIT
                .EXTRN  DST$BEGIN_ADDR, DST$END_ADDR
                .EXTRN  LRUM$MOST_RECENT
                .EXTRN  RST$REF_LIST, RST$TEMP_LIST
                .EXTRN  DBG$REG_VALUES, DBG$REG_VECTOR
                .EXTRN  RST$SET_SCOPE, RST$START_ADDR
                .EXTRN  SAT$START_ADDR, SCOPE$LIST

                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                001C 00000      .ENTRY  DBG$ADDRESS_STRING, Save R2,R3,R4       ; 0359
                        54 00000000'    EF  9E 00002    MOVAB   P.AAD, R4                       ;
                        5E              18  C2 00009    SUBL2   #24, SP                         ;
                                        5E  DD 0000C    PUSHL   SP                              ; 0404
                                    04  BC  DD 0000E    PUSHL   @ADDRESS_DESC                   ;
                    0000V   CF          02  FB 00011    CALLS   #2, DBG$TRANS_TO_REGNAME        ;
                        04              50  E9 00016    BLBC    R0, 1$                          ;
                        50              6E  D0 00019    MOVL    OUTPUT_BUFFER, R0               ; 0407
                                        04  00 0001C    RET                                     ;
                        07 00000000G    00  91 0001D 1$:    CMPB    DBG$GB_VERB, #7             ; 0413
                                        0C  12 00024    BNEQ    2$                              ;
                        53 00000000G    00  D0 00026    MOVL    DBG$GL_CMND_RADIX, RADIX        ; 0416
                        01              53  D1 0002D    CMPL    RADIX, #1                       ; 0417
                                        0A  12 00030    BNEQ    3$                              ;
                00000000G   00          00  FB 00032 2$:    CALLS   #0, DBG$NGET_RADIX          ; 0422
                        53              50  D0 00039    MOVL    R0, RADIX                       ;
                    10  AE              03  B0 0003C 3$:    MOVW    #3, CONTROL_DESC            ; 0452
                OF          01          53  CF 00040    CASEL   RADIX, #1, #15                  ; 0425
0020            0020            0020            0020        00044 4$:   .WORD   5$-4$,-         ;
0025            0020            0020            0020        0004C       5$-4$,-                 ;
0020            0020            0020            0020        00054       5$-4$,-                 ;
002B            0020            0020            0020        0005C       5$-4$,-                 ;
                                                                        5$-4$,-                 ;
                                                                        5$-4$,-                 ;
                                                                        5$-4$,-                 ;
```

```
                                                               6$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               5$-4$,-                          ;
                                                               7$-4$                            ;
                  50              64  9E 00064 5$:     MOVAB   P.AAD, R0                        ; 0453
                                  0A  11 00067         BRB     8$                               ;
                  50        FA    A4  9E 00069 6$:     MOVAB   P.AAB, R0                        ; 0434
                                  04  11 0006D         BRB     8$                               ;
                  50        FD    A4  9E 0006F 7$:     MOVAB   P.AAC, R0                        ; 0443
            14    AE              50  D0 00073 8$:     MOVL    R0, CONTROL_DESC+4               ; 0424
                                  05  DD 00077         PUSHL   #5                               ; 0461
     00000000G    00              01  FB 00079         CALLS   #1, DBG$GET_TEMPMEM              ;
                  6E              50  D0 00080         MOVL    R0, OUTPUT_BUFFER                ;
            08    AE              12  B0 00083         MOVW    #18, OUTPUT_DESC                 ; 0466
                  52              6E  D0 00087         MOVL    OUTPUT_BUFFER, R2                ; 0467
            0C    AE        02    A2  9E 0008A         MOVAB   2(R2), OUTPUT_DESC+4             ;
                            04    BC  DD 0008F         PUSHL   @ADDRESS_DESC                    ; 0471
                            0C    AE  9F 00092         PUSHAB  OUTPUT_DESC                      ; 0468
                            0C    AE  9F 00095         PUSHAB  FAO_LENGTH                       ;
                            1C    AE  9F 00098         PUSHAB  CONTROL_DESC                     ;
     00000000G    9F              04  FB 0009B         CALLS   #4, @#SYS$FAO                    ;
                  12              50  E8 000A2         BLBS    R0, 9$                           ;
                            03    A4  9F 000A5         PUSHAB  P.AAE                            ; 0473
                                  01  DD 000A8         PUSHL   #1                               ;
                      00028362    8F  DD 000AA         PUSHL   #164706                          ;
     00000000G    00              03  FB 000B0         CALLS   #3, LIB$SIGNAL                   ;
                  10              53  D1 000B7 9$:     CMPL    RADIX, #16                       ; 0479
                                  13  12 000BA         BNEQ    10$                              ;
                  39        02    A2  91 000BC         CMPB    2(R2), #57                       ; 0482
                                  0D  1B 000C0         BLEQU   10$                              ;
            01    A2              30  90 000C2         MOVB    #48, 1(R2)                       ; 0485
     62     04    AE              01  81 000C6         ADDB3   #1, FAO_LENGTH, (R2)             ; 0486
                  50              52  D0 000CB         MOVL    R2, R0                           ; 0487
                                  04 000CE             RET                                      ;
            01    A2        04    AE  90 000CF 10$:    MOVB    FAO_LENGTH, 1(R2)                ; 0495
                  50        01    A2  9E 000D4         MOVAB   1(R2), R0                        ; 0496
                                  04 000D8             RET                                      ; 0498

; Routine Size:  217 bytes,    Routine Base:  DBG$CODE + 0000
```

```
;  369     0499  1 GLOBAL ROUTINE DBG$BUILD_INVOC_RST(OLDRST, INVOCNUM) =
;  370     0500  1 !
;  371     0501  1 ! FUNCTION
;  372     0502  1 !       This routine builds an RST entry with an attached invocation number for
;  373     0503  1 !       a specified symbol.  To do this, it accepts the symbol's RST entry as
;  374     0504  1 !       input and creates a new copy of that RST entry.  The RST$V_INVOCNUM flag
;  375     0505  1 !       is set in the new copy.  It then builds an Invocation Number RST Entry
;  376     0506  1 !       to hold the actual invocation number.  The RST$L_SYMCHNPTR field in the
;  377     0507  1 !       new symbol entry is set to point to the Invocation Number RST Entry.
;  378     0508  1 !       Both new RST entries are added to the Temporary RST Entry List pointed
;  379     0509  1 !       to by RST$TEMP_LIST.  The new symbol RST entry represents this specific
;  380     0510  1 !       invocation of the new symbol, and its address is returned to the caller.
;  381     0511  1 !
;  382     0512  1 ! INPUTS
;  383     0513  1 !       OLDRST  - Pointer to the RST entry of the symbol to which an invocation
;  384     0514  1 !                 number should be attached.
;  385     0515  1 !
;  386     0516  1 !       INVOCNUM - The desired invocation number.  This is assumed to be applied
;  387     0517  1 !                  to the inner-most invocable entity (routine) in the scope in
;  388     0518  1 !                  which the OLDRST symbol is declared.
;  389     0519  1 !
;  390     0520  1 ! OUTPUTS
;  391     0521  1 !       A pointer to the new symbol RST entry (which includes the invocation
;  392     0522  1 !                  information) is returned as the routine value.
;  393     0523  1 !
;  394     0524  1
;  395     0525  2     BEGIN
;  396     0526  2
;  397     0527  2     MAP
;  398     0528  2         OLDRST: REF RST$ENTRY;          ! Pointer to the symbol RST entry
;  399     0529  2
;  400     0530  2     OWN
;  401     0531  2         RST_SIZE_TBL:                   ! RST entry size look-up table indexed
;  402     0532  2                 VECTOR[RST$K_KIND_MAXIMUM + 1, BYTE]    !       by entry kind
;  403     0533  2                 PRESET( [RST$K_INVALID]         = 0,
;  404     0534  2                         [RST$K_NOTUNIQUE]       = 0,
;  405     0535  2                         [RST$K_MODULE]          = 0,
;  406     0536  2                         [RST$K_ROUTINE]         = RST$K_ROUTENTSIZ,
;  407     0537  2                         [RST$K_BLOCK]           = RST$K_LEXENTSIZ,
;  408     0538  2                         [RST$K_ENTRY]           = RST$K_EPTENTSIZ,
;  409     0539  2                         [RST$K_LABEL]           = RST$K_LBLENTSIZ,
;  410     0540  2                         [RST$K_LINE]            = RST$K_LINENTSIZ,
;  411     0541  2                         [RST$K_DATA]            = RST$K_DATENTSIZ,
;  412     0542  2                         [RST$K_TYPCOMP]         = RST$K_DATENTSIZ,
;  413     0543  2                         [RST$K_TYPE]            = 0,
;  414     0544  2                         [RST$K_VARIANT]         = 0,
;  415     0545  2                         [RST$K_INVOCNUM]        = 0,
;  416     0546  2                         [RST$K_OVERLOAD]        = 0);
;  417     0547  2
;  418     0548  2     LOCAL
;  419     0549  2         INVPTR: REF RST$ENTRY,          ! Pointer to Invocation Number RST Entry
;  420     0550  2         NEWRST: REF RST$ENTRY,          ! Pointer to new copy of symbol RST
;  421     0551  2         SIZE;                           ! The size of this RST entry
;  422     0552  2
;  423     0553  2
;  424     0554  2
;  425     0555  2     ! Determine the size and validity of the symbol RST entry.  We do not accept
```

```
;  426          0556  2     ! Module, Type, or Variant RST entries.
;  427          0557  2     !
;  428          0558  2     SIZE = 0;
;  429          0559  2     IF (.OLDRST[RST$B_KIND] GEQ RST$K_KIND_MINIMUM) AND
;  430          0560  3        (.OLDRST[RST$B_KIND] LEQ RST$K_KIND_MAXIMUM)
;  431          0561  2     THEN
;  432          0562  2         SIZE = .RST_SIZE_TBL[.OLDRST[RST$B_KIND]];
;  433          0563  2
;  434          0564  2     IF .SIZE EQL 0 THEN $DBG_ERROR('RSTACCESS\DBG$BUILD_INVOC_RST');
;  435          0565  2
;  436          0566  2
;  437          0567  2     ! Copy the symbol's RST entry (the "old" RST entry) into a new memory
;  438          0568  2     ! block (the "new" RST entry).  Note that we copy the whole memory block
;  439          0569  2     ! so that any embedded DST entry is copied also.  Then fill in all fields
;  440          0570  2     ! in the new entry that must be different from those in the old entry.
;  441          0571  2     !
;  442          0572  2     NEWRST = DBG$COPY_MEMORY(.OLDRST);
;  443          0573  2     NEWRST[RST$L_HASH_BLINK] = 0;
;  444          0574  3     IF .OLDRST[RST$L_DSTPTR] EQL (.OLDRST + 4*.SIZE)
;  445          0575  2     THEN
;  446          0576  2         NEWRST[RST$L_DSTPTR] = .NEWRST + 4*.SIZE;
;  447          0577  2
;  448          0578  2     NEWRST[RST$W_REFCOUNT] = 0;
;  449          0579  2
;  450          0580  2
;  451          0581  2     ! Put the new symbol entry on the Temporary RST Entry List.
;  452          0582  2     !
;  453          0583  2     NEWRST[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  454          0584  2     RST$TEMP_LIST = .NEWRST;
;  455          0585  2
;  456          0586  2
;  457          0587  2     ! Now build the Invocation Number RST Entry to go with the new symbol entry.
;  458          0588  2     ! Also put it on the Temporary RST Entry List.
;  459          0589  2     !
;  460          0590  2     INVPTR = DBG$GET_MEMORY(RST$K_INVENTSIZ);
;  461          0591  2     INVPTR[RST$L_UPS[OPEPTR] = .OLDRST;
;  462          0592  2     INVPTR[RST$B_KIND] = RST$K_INVOCNUM;
;  463          0593  2     INVPTR[RST$L_INVOCNUM] = .INVOCNUM;
;  464          0594  2     INVPTR[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  465          0595  2     RST$TEMP_LIST = .INVPTR;
;  466          0596  2
;  467          0597  2
;  468          0598  2     ! Finally put a link in the symbol's new RST entry which points to the
;  469          0599  2     ! Invocation Number RST Entry.  Then return the address of the new entry.
;  470          0600  2     !
;  471          0601  2     NEWRST[RST$L_SYMCHNPTR] = .INVPTR;
;  472          0602  2     NEWRST[RST$V_INVOCNUM] = TRUE;
;  473          0603  2     RETURN .NEWRST;
;  474          0604  2
;  475          0605  1     END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

24  47  42  44  5C  53  53  45  43  43  41  54  53  52  1D  00030 P.AAF:  .ASCII  <29>\RSTACCESS\<92>\DBG$BUILD_INVOC_RS\     ;
    53  52  5F  43  4F  56  4E  49  5F  44  4C  49  55  42  0003F                                                              ;
```

```
                                                54  0004D          .ASCII  \T\                                                     ;

                                                                   .PSECT  DBG$OWN,NOEXE,  PIC,2

    00  00  00  07  00  0B  00  07  08  07  08  0B  00  00  0000C RST_SIZE_TBL:
                                                                   .BYTE   0, 0, 11, 8, 7, 8, 7, 0, 11, 0, 7, 0, 0, 0  ;


                                                                   .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                  003C  00000      .ENTRY  DBG$BUILD_INVOC_RST, Save R2,R3,R4,R5            ; 0499
                                    55 00000000G   00    9E  00002  MOVAB   RST$TEMP_LIST, R5                                ;
                                                   53    D4  00009  CLRL    SIZE                                            ; 0558
                                    54        04   AC    D0  0000B  MOVL    OLDRST, R4                                      ; 0560
                                    50        14   A4    9A  0000F  MOVZBL  20(R4), R0                                      ;
                                    0D             50    91  00013  CMPB    R0, #13                                         ;
                                                   08    1A  00016  BGTRU   1$                                              ;
                                    53 00000000'EF40    9A  00018  MOVZBL  RST_SIZE_TBL[R0], SIZE                          ; 0562
                                                   53    D5  00020 1$:      TSTL    SIZE                                    ; 0564
                                                   15    12  00022  BNEQ    2$                                              ;
                                       00000000'   EF    9F  00024  PUSHAB  P.AAF                                           ;
                                                   01    DD  0002A  PUSHL   #1                                              ;
                                       00028362    8F    DD  0002C  PUSHL   #164706                                         ;
                              00000000G  00              03    FB  00032  CALLS   #3, LIB$SIGNAL                            ;
                                                   54    DD  00039 2$:      PUSHL   R4                                      ; 0572
                              00000000G  00              01    FB  0003B  CALLS   #1, DBG$COPY_MEMORY                       ;
                                    52             50    D0  00042  MOVL    R0, NEWRST                                      ;
                                             04    A2    D4  00045  CLRL    4(NEWRST)                                       ; 0573
                                    50          6443   DE  00048  MOVAL   (R4)[SIZE], R0                                  ; 0574
                                    50        0C   A4    D1  0004C  CMPL    12(R4), R0                                      ;
                                                   05    12  00050  BNEQ    3$                                              ;
                                       0C    A2          6243   DE  00052  MOVAL   (NEWRST)[SIZE], 12(NEWRST)              ; 0576
                                             16    A2    B4  00057 3$:      CLRW    22(NEWRST)                              ; 0578
                                    62             65    D0  0005A  MOVL    RST$TEMP_LIST, (NEWRST)                         ; 0583
                                    65             52    D0  0005D  MOVL    NEWRST, RST$TEMP_LIST                           ; 0584
                                                   07    DD  00060  PUSHL   #7                                              ; 0590
                              00000000G  00              01    FB  00062  CALLS   #1, DBG$GET_MEMORY                        ;
                                    10   A0             54    D0  00069  MOVL    R4, 16(INVPTR)                          ; 0591
                                    14   A0             0C    90  0006D  MOVB    #12, 20(INVPTR)                         ; 0592
                                    18   A0       08    AC    D0  00071  MOVL    INVOCNUM, 24(INVPTR)                    ; 0593
                                    60             65    D0  00076  MOVL    RST$TEMP_LIST, (INVPTR)                         ; 0594
                                    65             50    D0  00079  MOVL    INVPTR, RST$TEMP_LIST                           ; 0595
                                       08    A2          50    D0  0007C  MOVL    INVPTR, 8(NEWRST)                       ; 0601
                                       15    A2          04    88  00080  BISB2   #4, 21(NEWRST)                          ; 0602
                                    50             52    D0  00084  MOVL    NEWRST, R0                                      ; 0603
                                                   04    00  00087  RET                                                    ; 0605

; Routine Size:  136 bytes,    Routine Base:  DBG$CODE + 00D9
```

```
;  477          0606  1 GLOBAL ROUTINE DBG$GET_INNER_REC_ADDRESS( Primptr ) =
;  478          0607  1 !
;  479          0608  1 ! FUNCTION
;  480          0609  1 !       DBG$GET_INNER_REC_ADDRESS returns the address of the inner record
;  481          0610  1 !       based on the primary pointer passed.
;  482          0611  1 !       It's called from the stack machine when the value of a record's field
;  483          0612  1 !       depends on the contents of the record.
;  484          0613  1 !
;  485          0614  1 ! INPUTS
;  486          0615  1 !       Primptr - A pointer to a primary descriptor passed by value.
;  487          0616  1 !
;  488          0617  1 ! OUTPUTS
;  489          0618  1 !       The address of the inner record.
;  490          0619  1 !
;  491          0620  1 ! SIDE EFFECTS
;  492          0621  1 !       Errors may be signaled
;  493          0622  1 !
;  494          0623  2     BEGIN
;  495          0624  2
;  496          0625  2     RETURN GET_RECORD_ADDRESS( .Primptr, Inner );
;  497          0626  2
;  498          0627  1     END;


                                0000 00000          .ENTRY  DBG$GET_INNER_REC_ADDRESS, Save nothing     ; 0606
                             02   DD 00002          PUSHL   #2                                          ; 0625
                          04 AC   DD 00004          PUSHL   PRIMPTR                                     ;
                 0000V    CF     02 FB 00007          CALLS   #2, GET_RECORD_ADDRESS                    ;
                                 04 0000C          RET                                                 ; 0627

; Routine Size:  13 bytes,    Routine Base:  DBG$CODE + 0161
```

```
;  500          0628  1 GLOBAL ROUTINE DBG$GET_OUTER_REC_ADDRESS( Primptr ) =
;  501          0629  1 !
;  502          0630  1 !  FUNCTION
;  503          0631  1 !        DBG$GET_OUTER_REC_ADDRESS returns the address of the outer record
;  504          0632  1 !        based on the primary pointer passed.
;  505          0633  1 !        It's called from the stack machine when the value of a record's field
;  506          0634  1 !        depends on the contents of the record.
;  507          0635  1 !
;  508          0636  1 !  INPUTS
;  509          0637  1 !        Primptr - A pointer to a primary descriptor passed by value.
;  510          0638  1 !
;  511          0639  1 !  OUTPUTS
;  512          0640  1 !        The address of the outer record.
;  513          0641  1 !
;  514          0642  1 !  SIDE EFFECTS
;  515          0643  1 !        Errors may be signaled
;  516          0644  1 !
;  517          0645  2       BEGIN
;  518          0646  2
;  519          0647  2       RETURN GET_RECORD_ADDRESS( .Primptr, Outer );
;  520          0648  2
;  521          0649  1       END;


                                0000 00000          .ENTRY  DBG$GET_OUTER_REC_ADDRESS, Save nothing     ; 0628
                             01   DD 00002          PUSHL   #1                                          ; 0647
                          04 AC   DD 00004          PUSHL   PRIMPTR                                     ;
                0000V CF          02 FB 00007          CALLS   #2, GET_RECORD_ADDRESS                   ;
                                  04 0000C          RET                                                 ; 0649

; Routine Size:  13 bytes,    Routine Base:  DBG$CODE + 016E
```

```
;  523     0650  1 GLOBAL ROUTINE DBG$IS_IT_ENTRY(ADDR) =
;  524     0651  1
;  525     0652  1 !++
;  526     0653  1 ! FUNCTION
;  527     0654  1 !       This routine decides whether a given virtual address in the user program
;  528     0655  1 !       is the address of a CALL entry mask.  It returns TRUE if the given ad-
;  529     0656  1 !       dress is the start address of a routine or entry point callable with the
;  530     0657  1 !       CALLS and CALLG instructions.  It returns FALSE in all other cases.
;  531     0658  1 !
;  532     0659  1 !       This routine is called in the processing of breakpoints because if a
;  533     0660  1 !       breakpoint is set on a CALL routine (as opposed to a JSB routine or an
;  534     0661  1 !       ordinary code location), the BPT instruction must be placed two bytes
;  535     0662  1 !       past the routine address so it falls on the first instruction instead
;  536     0663  1 !       of the entry mask.
;  537     0664  1 !
;  538     0665  1 ! INPUTS
;  539     0666  1 !       ADDR    - The input address.  This routine will determine whether this
;  540     0667  1 !                 address points to an entry mask or not.
;  541     0668  1 !
;  542     0669  1 ! OUTPUTS
;  543     0670  1 !       The routine returns TRUE if ADDR is the address of an entry mask, i.e.
;  544     0671  1 !                 is the address of a CALLS or CALLG routine or entry point.
;  545     0672  1 !                 The routine returns FALSE otherwise.
;  546     0673  1 !--
;  547     0674  2     BEGIN
;  548     0675  2
;  549     0676  2     LOCAL
;  550     0677  2         DSTPTR: REF DST$RECORD,         ! Pointer to Routine Begin DST Record
;  551     0678  2         GSTPTR: REF RST$ENTRY,          ! Pointer to Global Symbol Table record
;  552     0679  2         MODRSTPTR: REF RST$ENTRY,       ! Pointer to current Module RST Entry
;  553     0680  2         PROG_SATPTR: REF SAT$ENTRY,     ! Pointer to Program SAT entry
;  554     0681  2         RSTPTR: REF RST$ENTRY,          ! Pointer to current RST entry
;  555     0682  2         SATPTR: REF SAT$ENTRY;          ! Pointer to SAT entry for a symbol
;  556     0683  2
;  557     0684  2
;  558     0685  2
;  559     0686  2     ! Search through the Program Static Address Table.  Here we are looking for
;  560     0687  2     ! a module which covers the ADDR address.
;  561     0688  2     !
;  562     0689  2     PROG_SATPTR = .SAT$START_ADDR;
;  563     0690  2     WHILE .PROG_SATPTR NEQ 0 DO
;  564     0691  2         BEGIN
;  565     0692  2
;  566     0693  2
;  567     0694  2         ! If the current Static Address Table entry is past the address we are
;  568     0695  2         ! looking for (has a higher start address), we exit the search loop
;  569     0696  2         ! without finding a suitable SAT entry.  This works because the Static
;  570     0697  2         ! Address Table is sorted on the start address.
;  571     0698  2         !
;  572     0699  2         IF .PROG_SATPTR[SAT$L_START] GTRA .ADDR THEN EXITLOOP;
;  573     0700  2
;  574     0701  2
;  575     0702  2         ! If ADDR is in the range of this SAT entry, we go to the corresponding
;  576     0703  2         ! Module RST Entry and search that module's Static Address Table.
;  577     0704  2         !
;  578     0705  2         IF .PROG_SATPTR[SAT$L_END] GEQA .ADDR
;  579     0706  3         THEN
```

```
;  580          0707  4          BEGIN
;  581          0708  4
;  582          0709  4
;  583          0710  4          ! Loop through this module's SAT looking for a symbol whose address
;  584          0711  4          ! matches the desired ADDR address.  If we find such a symbol, we
;  585          0712  4          ! see if it is an entry point.
;  586          0713  4          !
;  587          0714  4          MODRSTPTR = .PROG_SATPTR[SAT$L_RSTPTR];
;  588          0715  4          SATPTR = .MODRSTPTR[RST$L_SAT_PTR];
;  589          0716  4          WHILE .SATPTR NEQ 0 DO
;  590          0717  5              BEGIN
;  591          0718  5
;  592          0719  5
;  593          0720  5              ! If this SAT entry is past the desired address, exit this
;  594          0721  5              ! loop--there is no symbol for the address in this module.
;  595          0722  5              ! (Again, this Static Address Table is sorted on start address.)
;  596          0723  5              !
;  597          0724  5              IF .SATPTR[SAT$L_START] GTRA .ADDR THEN EXITLOOP;
;  598          0725  5
;  599          0726  5
;  600          0727  5              ! If this SAT entry has exactly the start address we want, we
;  601          0728  5              ! return TRUE if the corresponding symbol is a CALL routine,
;  602          0729  5              ! an entry point, or "entry mask" data type.
;  603          0730  5              !
;  604          0731  5              IF .SATPTR[SAT$L_START] EQLA .ADDR
;  605          0732  5              THEN
;  606          0733  6                  BEGIN
;  607          0734  6                  RSTPTR = .SATPTR[SAT$L_RSTPTR];
;  608          0735  6
;  609          0736  6                  ! Check for a CALL routine.
;  610          0737  6                  !
;  611          0738  6                  IF .RSTPTR[RST$B_KIND] EQL RST$K_ROUTINE
;  612          0739  6                  THEN
;  613          0740  7                      BEGIN
;  614          0741  7                      DSTPTR = .RSTPTR[RST$L_DSTPTR];
;  615          0742  7                      IF (.DSTPTR[DST$B_TYPE] EQL DST$K_RTNBEG) AND
;  616          0743  8                         (NOT .DSTPTR[DST$V_RTNBEG_NO_CALL])
;  617          0744  7                      THEN
;  618          0745  7                          RETURN TRUE;
;  619          0746  7
;  620          0747  6                      END;
;  621          0748  6
;  622          0749  6                  ! Check for an entry point.
;  623          0750  6                  !
;  624          0751  6                  IF .RSTPTR[RST$B_KIND] EQL RST$K_ENTRY THEN RETURN TRUE;
;  625          0752  6
;  626          0753  6                  ! Check for data of type ZEM (entry mask). This arises
;  627          0754  6                  ! if routines are passed as parameters to other routines.
;  628          0755  6                  ! This situation also arises when routine names are
;  629          0756  6                  ! imported in PASCAL from environment files.
;  630          0757  6                  !
;  631          0758  6                  IF .RSTPTR[RST$B_KIND] EQL RST$K_DATA
;  632          0759  6                  THEN
;  633          0760  7                      BEGIN
;  634          0761  7                      DSTPTR = .RSTPTR[RST$L_DSTPTR];
;  635          0762  7                      IF .DSTPTR[DST$B_TYPE] EQL DSC$K_DTYPE_ZEM
;  636          0763  7                      THEN
```

```
;  637     0764  7                        RETURN TRUE;
;  638     0765  6                    END;
;  639     0766  5                END;
;  640     0767  5
;  641     0768  5
;  642     0769  5                ! Loop for the next symbol SAT entry in this module.
;  643     0770  5                !
;  644     0771  5                SATPTR = .SATPTR[SAT$L_FLINK];
;  645     0772  4                END;
;  646     0773  4
;  647     0774  3            END;                        ! End of IF for ADDR in SAT entry range
;  648     0775  3
;  649     0776  3
;  650     0777  3            ! Address not found in this module--loop for the next Program Static
;  651     0778  3            ! Address Table entry.
;  652     0779  3            !
;  653     0780  3            PROG_SATPTR = .PROG_SATPTR[SAT$L_FLINK];
;  654     0781  3            END;
;  655     0782  2
;  656     0783  2
;  657     0784  2        ! A CALL routine or entry point symbol for the address could not be found
;  658     0785  2        ! anywhere in the Static Address Table or in any SET module.  We therefore
;  659     0786  2        ! have to search the Global Symbol Table to see if a symbol for the address
;  660     0787  2        ! is declared there.
;  661     0788  2        !
;  662     0789  2        GSTPTR = .RST$START_ADDR;
;  663     0790  2        WHILE TRUE DO
;  664     0791  3            BEGIN
;  665     0792  3
;  666     0793  3
;  667     0794  3            ! Get a pointer to the next GST entry.  Exit loop if there are no more.
;  668     0795  3            !
;  669     0796  3            IF .GSTPTR EQL 0 THEN EXITLOOP;
;  670     0797  3
;  671     0798  3
;  672     0799  3            ! If this is a Routine or Entry GST Record for the exact address we
;  673     0800  3            ! are looking for, return TRUE -- the address is an entry point.
;  674     0801  3            !
;  675     0802  3            IF .GSTPTR[RST$B_KIND] EQL RST$K_ROUTINE
;  676     0803  3            THEN
;  677     0804  4                BEGIN
;  678     0805  4                IF .GSTPTR[RST$L_STARTADDR] EQLA .ADDR THEN RETURN TRUE;
;  679     0806  4                END;
;  680     0807  3
;  681     0808  3
;  682     0809  3            ! Get next GST entry by following the RST symbol chain pointer.
;  683     0810  3            !
;  684     0811  3            GSTPTR = .GSTPTR[RST$L_SYMCHNPTR];
;  685     0812  3            END;
;  686     0813  2
;  687     0814  2
;  688     0815  2        ! We did not find an entry or procedure definition for the address in the
;  689     0816  2        ! GST either.  It is thus not an entry point and we return FALSE.
;  690     0817  2        !
;  691     0818  2        RETURN FALSE;
;  692     0819  2
;  693     0820  1        END;
```

```
                         003C 00000          .ENTRY  DBG$IS_IT_ENTRY, Save R2,R3,R4,R5                       ; 0650
                52 00000000G   00   D0 00002 MOVL    SAT$START_ADDR, PROG_SATPTR                             ; 0689
                54             04   AC   D0 00009 MOVL    ADDR, R4                                        ; 0699
                                    52   D5 0000D 1$:    TSTL    PROG_SATPTR                                 ; 0690
                                    58   13 0000F       BEQL    6$                                          ;
                54             04   A2   D1 00011       CMPL    4(PROG_SATPTR), R4                          ; 0699
                                    52   1A 00015       BGTRU   6$                                          ;
                54             08   A2   D1 00017       CMPL    8(PROG_SATPTR), R4                          ; 0705
                                    47   1F 0001B       BLSSU   5$                                          ;
                55             0C   A2   D0 0001D       MOVL    12(PROG_SATPTR), MODRSTPTR                  ; 0714
                51             18   A5   D0 00021       MOVL    24(MODRSTPTR), SATPTR                       ; 0715
                                    3D   13 00025 2$:    BEQL    5$                                          ; 0716
                54             04   A1   D1 00027       CMPL    4(SATPTR), R4                               ; 0724
                                    37   1A 0002B       BGTRU   5$                                          ;
                                    30   12 0002D       BNEQ    4$                                          ; 0731
                50             0C   A1   D0 0002F       MOVL    12(SATPTR), RSTPTR                          ; 0734
                02             14   A0   91 00033       CMPB    20(RSTPTR), #2                              ; 0738
                                    10   12 00037       BNEQ    3$                                          ;
                53             0C   A0   D0 00039       MOVL    12(RSTPTR), DSTPTR                          ; 0741
             BE 8F             01   A3   91 0003D       CMPB    1(DSTPTR), #190                             ; 0742
                                    05   12 00042       BNEQ    3$                                          ;
                               02   A3   95 00044       TSTB    2(DSTPTR)                                   ; 0743
                                    35   18 00047       BGEQ    8$                                          ;
                08             14   A0   91 00049 3$:    CMPB    20(RSTPTR), #8                              ; 0751
                                    2F   13 0004D       BEQL    8$                                          ;
                06             14   A0   91 0004F       CMPB    20(RSTPTR), #6                              ; 0758
                                    0A   12 00053       BNEQ    4$                                          ;
                53             0C   A0   D0 00055       MOVL    12(RSTPTR), DSTPTR                          ; 0761
                17             01   A3   91 00059       CMPB    1(DSTPTR), #23                              ; 0762
                                    1F   13 0005D       BEQL    8$                                          ;
                51                  61   D0 0005F 4$:    MOVL    (SATPTR), SATPTR                            ; 0771
                                    C1   11 00062       BRB     2$                                          ; 0716
                52                  62   D0 00064 5$:    MOVL    (PROG_SATPTR), PROG_SATPTR                  ; 0780
                                    A4   11 00067       BRB     1$                                          ; 0690
                51 00000000G        00   D0 00069 6$:    MOVL    RST$START_ADDR, GSTPTR                      ; 0789
                                    16   13 00070 7$:    BEQL    10$                                         ; 0796
                02             14   A1   91 00072       CMPB    20(GSTPTR), #2                              ; 0802
                                    0A   12 00076       BNEQ    9$                                          ;
                54             18   A1   D1 00078       CMPL    24(GSTPTR), R4                              ; 0805
                                    04   12 0007C       BNEQ    9$                                          ;
                50                  01   D0 0007E 8$:    MOVL    #1, R0                                      ;
                                         04 00081       RET                                                 ;
                51             08   A1   D0 00082 9$:    MOVL    8(GSTPTR), GSTPTR                           ; 0811
                                    E8   11 00086       BRB     7$                                          ; 0790
                                    50   D4 00088 10$:   CLRL    R0                                          ; 0818
                                         04 0008A       RET                                                 ; 0820

; Routine Size:  139 bytes,    Routine Base:  DBG$CODE + 017B
```

```
;  695          0821  1 GLOBAL ROUTINE DBG$RST_SHOWSCOPE: NOVALUE =
;  696          0822  1 !
;  697          0823  1 ! FUNCTION
;  698          0824  1 !       This routine does most of the work of handling the SHOW SCOPE command.
;  699          0825  1 !       It goes through the internal Scope List, and for each scope entry it
;  700          0826  1 !       prints out the corresponding scope name.
;  701          0827  1 !
;  702          0828  1 ! INPUTS
;  703          0829  1 !       NONE
;  704          0830  1 !
;  705          0831  1 ! OUTPUTS
;  706          0832  1 !       The SHOW SCOPE response (i.e., "scope: scope-list") is printed out.
;  707          0833  1 !               No value is returned.
;  708          0834  1 !
;  709          0835  1
;  710          0836  2     BEGIN
;  711          0837  2
;  712          0838  2     LOCAL
;  713          0839  2         INVOCNUM,                       ! Invocation number for numeric scope
;  714          0840  2         MODRSTPTR,                      ! Return parameter not actually used
;  715          0841  2         PATHNAME,                       ! Pointer to Pathname Descriptor
;  716          0842  2         PATH_STRING,                    ! Pointer to pathname counted string
;  717          0843  2         RSTPTR,                         ! Pointer to scope RST entry
;  718          0844  2         SCOPE: REF SCOPE$ENTRY;         ! Pointer to current scope list entry
;  719          0845  2
;  720          0846  2
;  721          0847  2
;  722          0848  2     ! Print the initial "scope: " text.
;  723          0849  2     !
;  724          0850  2     DBG$PRINT(UPLIT BYTE(%ASCIC 'scope: '), 0);
;  725          0851  2
;  726          0852  2
;  727          0853  2     ! Loop through all the Scope List entries until we find the all-set-modules
;  728          0854  2     ! scope.  For each scope, print out the scope name.
;  729          0855  2     !
;  730          0856  2     SCOPE = .SCOPE$LIST;
;  731          0857  2     WHILE .SCOPE[SCOPE$L_STATE] NEQ SCOPE$K_SETMODS DO
;  732          0858  3         BEGIN
;  733          0859  3
;  734          0860  3
;  735          0861  3         ! Print the comma between scope entries.
;  736          0862  3         !
;  737          0863  3         IF .SCOPE NEQ .SCOPE$LIST
;  738          0864  3         THEN
;  739          0865  3             DBG$PRINT(UPLIT BYTE(%ASCIC ', '), 0);
;  740          0866  3
;  741          0867  3
;  742          0868  3         ! Now do a CASE on the kind of Scope List entry this is.
;  743          0869  3         !
;  744          0870  3         CASE .SCOPE[SCOPE$L_STATE] FROM SCOPE$K_NORMAL TO SCOPE$K_SETMODS OF
;  745          0871  3             SET
;  746          0872  3
;  747          0873  3
;  748          0874  3             ! Handle normal scopes as set with the SET SCOPE command.  Convert
;  749          0875  3             ! the scope to a Pathname Descriptor; then convert that to a counted
;  750          0876  3             ! ASCII string and print that string.
;  751          0877  3             !
```

```
;  752     0878  3          [SCOPE$K_NORMAL]:
;  753     0879  4              BEGIN
;  754     0880  4              DBG$STA_SYMPATHNAME(.SCOPE[SCOPE$L_RSTPTR], PATHNAME);
;  755     0881  4              DBG$NPATHDESC_TO_CS(.PATHNAME, PATH_STRING);
;  756     0882  4              DBG$PRINT(UPLIT BYTE(%ASCIC '!AC'), .PATH_STRING);
;  757     0883  3              END;
;  758     0884  3
;  759     0885  3
;  760     0886  3          ! Handle "numbered" scopes, i.e. scopes relative to the current top
;  761     0887  3          ! of the call stack.  Here we first print the number itself and then
;  762     0888  3          ! the actual scope this corresponds to at present.
;  763     0889  3          !
;  764     0890  3          [SCOPE$K_NUMBERED]:
;  765     0891  4              BEGIN
;  766     0892  4              DBG$PRINT(UPLIT BYTE(%ASCIC '!SL'), .SCOPE[SCOPE$L_MODPTR]);
;  767     0893  4              DBG$STA_NUMBERED_SCOPE(.SCOPE[SCOPE$L_MODPTR],
;  768     0894  4                                     MODRSTPTR, RSTPTR, INVOCNUM);
;  769     0895  4              IF .RSTPTR NEQ 0
;  770     0896  4              THEN
;  771     0897  5                  BEGIN
;  772     0898  5                  IF .INVOCNUM NEQ 0
;  773     0899  5                  THEN
;  774     0900  5                      RSTPTR = DBG$BUILD_INVOC_RST(.RSTPTR, .INVOCNUM);
;  775     0901  5
;  776     0902  5                  DBG$STA_SYMPATHNAME(.RSTPTR, PATHNAME);
;  777     0903  5                  DBG$NPATHDESC_TO_CS(.PATHNAME, PATH_STRING);
;  778     0904  5                  DBG$PRINT(UPLIT BYTE(%ASCIC ' [ = !AC ]'), .PATH_STRING);
;  779     0905  4                  END;
;  780     0906  4
;  781     0907  3                  END;
;  782     0908  3
;  783     0909  3
;  784     0910  3                  ! Handle the Global scope.  This is done by simply printing "\".
;  785     0911  3                  !
;  786     0912  3                  [SCOPE$K_GLOBAL]:
;  787     0913  3                      DBG$PRINT(UPLIT BYTE(%ASCIC '\'), 0);
;  788     0914  3
;  789     0915  3
;  790     0916  3                  ! Handle the all SET modules scope.  Since we should never get here,
;  791     0917  3                  ! we just signal an error.
;  792     0918  3                  !
;  793     0919  3                  [SCOPE$K_SETMODS]:
;  794     0920  3                      $DBG_ERROR('RSTACCESS\SHOWSCOPE');
;  795     0921  3
;  796     0922  3                  TES;
;  797     0923  3
;  798     0924  3
;  799     0925  3              ! Link on to the next Scope List entry and loop for the next scope.
;  800     0926  3              !
;  801     0927  3              SCOPE = .SCOPE[SCOPE$L_FLINK];
;  802     0928  2              END;
;  803     0929  2
;  804     0930  2
;  805     0931  2          ! We are all done.  Flush the output buffer and return.
;  806     0932  2          !
;  807     0933  2          DBG$NEWLINE();
;  808     0934  2          RETURN;
```

```
;  809          0935  2
;  810          0936  1     END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                                20  3A  65  70  6F  63  73  07  0004E P.AAG:   .ASCII  <7>\scope: \                          ;
                                                20  2C  02  00056 P.AAH:   .ASCII  <2>\, \                              ;
                                                43  41  21  03  00059 P.AAI:   .ASCII  <3>\!AC\                          ;
                                                4C  53  21  03  0005D P.AAJ:   .ASCII  <3>\!SL\                          ;
                        5D  20  43  41  21  20  3D  20  5B  20  0A  00061 P.AAK:   .ASCII  <10>\ [ = !AC ]\                 ;
                                                            5C  01  0006C P.AAL:   .ASCII  <1><92>                       ;
57  4F  48  53  5C  53  53  45  43  43  41  54  53  52  13  0006E P.AAM:   .ASCII  <19>\RSTACCESS\<92>\SHOWSCOPE\          ;
                                                    45  50  4F  43  53  0007D


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                    007C 00000          .ENTRY  DBG$RST_SHOWSCOPE, Save R2,R3,R4,R5,R6      ; 0821
                                56 00000000G   00    9E 00002          MOVAB   DBG$NPATHDESC_TO_CS, R6                     ;
                                55 00000000G   00    9E 00009          MOVAB   SCOPE$LIST, R5                              ;
                                54 00000000G   00    9E 00010          MOVAB   DBG$PRINT, R4                               ;
                                53 00000000'   EF    9E 00017          MOVAB   P.AAG, R3                                   ;
                                5E             14    C2 0001E          SUBL2   #20, SP                                     ;
                                               7E    D4 00021          CLRL    -(SP)                                       ; 0850
                                               53    DD 00023          PUSHL   R3                                          ;
                                64             02    FB 00025          CALLS   #2, DBG$PRINT                               ;
                                52             65    D0 00028          MOVL    SCOPE$LIST, SCOPE                           ; 0856
                                04       04    A2    D1 0002B 1$:      CMPL    4(SCOPE), #4                                ; 0857
                                                03    12 0002F          BNEQ    2$                                          ;
                                             00A4     31 00031          BRW     12$                                         ;
                                65             52    D1 00034 2$:      CMPL    SCOPE, SCOPE$LIST                           ; 0863
                                               08    13 00037          BEQL    3$                                          ;
                                               7E    D4 00039          CLRL    -(SP)                                       ; 0865
                                         08    A3    9F 0003B          PUSHAB  P.AAH                                       ;
                                64             02    FB 0003E          CALLS   #2, DBG$PRINT                               ;
                      03              01       04    A2    CF 00041 3$:      CASEL   4(SCOPE), #1, #3                    ; 0870
007A                  0070              0024         0008          00046 4$:      .WORD   5$-4$,-                             ;
                                                                                            6$-4$,-                         ;
                                                                                            8$-4$,-                         ;
                                                                                            10$-4$                          ;
                                         0C    AE    9F 0004E 5$:      PUSHAB  PATHNAME                                    ; 0880
                                         08    A2    DD 00051          PUSHL   8(SCOPE)                                    ;
                                   0000V CF          02    FB 00054          CALLS   #2, DBG$STA_SYMPATHNAME               ;
                                         10    AE    9F 00059          PUSHAB  PATH_STRING                                 ; 0881
                                         10    AE    DD 0005C          PUSHL   PATHNAME                                    ;
                                64             02    FB 0005F          CALLS   #2, DBG$NPATHDESC_TO_CS                     ;
                                         10    AE    DD 00062          PUSHL   PATH_STRING                                 ; 0882
                                         0B    A3    9F 00065          PUSHAB  P.AAI                                       ;
                                               51    11 00068          BRB     9$                                          ;
                                         0C    A2    DD 0006A 6$:      PUSHL   12(SCOPE)                                   ; 0892
                                         0F    A3    9F 0006D          PUSHAB  P.AAJ                                       ;
                                64             02    FB 00070          CALLS   #2, DBG$PRINT                               ;
                                               5E    DD 00073          PUSHL   SP                                          ; 0893
                                         08    AE    9F 00075          PUSHAB  RSTPTR                                      ;
```

```
                        10   AE  9F 00078          PUSHAB  MODRSTPTR                                    ;
                        0C   A2  DD 0007B          PUSHL   12(SCOPE)                                    ;
                0000V   CF       04 FB 0007E       CALLS   #4, DBG$STA_NUMBERED_SCOPE                   ;
                        04   AE  D5 00083          TSTL    RSTPTR                                       ; 0895
                             4A  13 00086          BEQL    11$                                          ;
                             6E  D5 00088          TSTL    INVOCNUM                                     ; 0898
                             0E  13 0008A          BEQL    7$                                           ;
                             6E  DD 0008C          PUSHL   INVOCNUM                                     ; 0900
                        08   AE  DD 0008E          PUSHL   RSTPTR                                       ;
                FE3D    CF       02 FB 00091       CALLS   #2, DBG$BUILD_INVOC_RST                      ;
                  04    AE       50 D0 00096       MOVL    R0, RSTPTR                                   ;
                        0C   AE  9F 0009A 7$:      PUSHAB  PATHNAME                                     ; 0902
                        08   AE  DD 0009D          PUSHL   RSTPTR                                       ;
                0000V   CF       02 FB 000A0       CALLS   #2, DBG$STA_SYMPATHNAME                      ;
                        10   AE  9F 000A5          PUSHAB  PATH_STRING                                  ; 0903
                        10   AE  DD 000A8          PUSHL   PATHNAME                                     ;
                             66  02 FB 000AB       CALLS   #2, DBG$NPATHDESC_TO_CS                      ;
                        10   AE  DD 000AE          PUSHL   PATH_STRING                                  ; 0904
                        13   A3  9F 000B1          PUSHAB  P.AAR                                        ;
                             05  11 000B4          BRB     9$                                           ;
                             7E  D4 000B6 8$:      CLRL    -(SP)                                        ; 0913
                        1E   A3  9F 000B8          PUSHAB  P.AAL                                        ;
                             64  02 FB 000BB 9$:   CALLS   #2, DBG$PRINT                                ;
                             12  11 000BE          BRB     11$                                          ;
                        20   A3  9F 000C0 10$:     PUSHAB  P.AAM                                        ; 0920
                             01  DD 000C3          PUSHL   #1                                           ;
                    00028362     8F DD 000C5       PUSHL   #164706                                      ;
        00000000G   00           03 FB 000CB       CALLS   #3, LIB$SIGNAL                               ;
                             52  62 D0 000D2 11$:   MOVL    (SCOPE), SCOPE                               ; 0927
                            FF53 31 D5 000D5       BRW     1$                                           ; 0857
        00000000G   00           00 FB 000D8 12$:   CALLS   #0, DBG$NEWLINE                              ; 0933
                                 04 000DF          RET                                                  ; 0936

; Routine Size:  224 bytes,    Routine Base:  DBG$CODE + 0206
```

```
;  812          0937  1 GLOBAL ROUTINE DBG$RST_TEMP_RELEASE: NOVALUE =
;  813          0938  1 !
;  814          0939  1 ! FUNCTION
;  815          0940  1 !       This routine releases all "temporary" RST entries back to the DEBUG
;  816          0941  1 !       memory pool.  "Temporary" RST entries are RST entries which are created
;  817          0942  1 !       dynamically during the execution of a DEBUG command.  These include
;  818          0943  1 !       Data RST Entries for record components, RST entries for objects with
;  819          0944  1 !       invocation numbers, Line Number RST Entries, and most Data Type RST
;  820          0945  1 !       Entries.  RST entries which are created by the SET MODULE command or
;  821          0946  1 !       during DEBUG initialization are not temporary RST entries.
;  822          0947  1 !
;  823          0948  1 !       When a temporary RST entry is created, it is not put on the module's
;  824          0949  1 !       symbol chain or entered in the RST Hash Table.  Instead, it is added
;  825          0950  1 !       to the singly linked list pointed to by RST$TEMP_LIST.  This routine
;  826          0951  1 !       is called at the end of every command to go through that list and to
;  827          0952  1 !       release every RST entry with a zero reference count to the DEBUG mem-
;  828          0953  1 !       ory pool.  An entry with a non-zero reference count cannot be released
;  829          0954  1 !       since something references that entry; the current location pseudo-
;  830          0955  1 !       symbol may be bound to a Primary Descriptor which in turn points to
;  831          0956  1 !       that RST entry, for example.
;  832          0957  1 !
;  833          0958  1 ! INPUTS
;  834          0959  1 !       NONE
;  835          0960  1 !
;  836          0961  1 ! OUTPUTS
;  837          0962  1 !       NONE
;  838          0963  1 !
;  839          0964  1
;  840          0965  2     BEGIN
;  841          0966  2
;  842          0967  2     LOCAL
;  843          0968  2         OLDPTR: REF RST$ENTRY,          ! Pointer to the previous RST entry in
;  844          0969  2                                         !      temporary RST entry list
;  845          0970  2         RSTPTR: REF RST$ENTRY;          ! Pointer to the current RST entry in
;  846          0971  2                                         !      the temporary RST entry list
;  847          0972  2
;  848          0973  2
;  849          0974  2
;  850          0975  2     ! Loop through the Temporary RST Entry List.  Release every entry with
;  851          0976  2     ! a zero reference count back to the memory pool.
;  852          0977  2     !
;  853          0978  2     OLDPTR = RST$TEMP_LIST;
;  854          0979  2     RSTPTR = .OLDPTR[RST$L_HASH_FLINK];
;  855          0980  2     WHILE .RSTPTR NEQ 0 DO
;  856          0981  3         BEGIN
;  857          0982  3         IF .RSTPTR[RST$W_REFCOUNT] EQL 0
;  858          0983  3         THEN
;  859          0984  4             BEGIN
;  860          0985  4             OLDPTR[RST$L_HASH_FLINK] = .RSTPTR[RST$L_HASH_FLINK];
;  861          0986  4             DBG$REL_MEMORY(.RSTPTR);
;  862          0987  4             END
;  863          0988  4
;  864          0989  3         ELSE
;  865          0990  3             OLDPTR = .RSTPTR;
;  866          0991  3
;  867          0992  3         RSTPTR = .OLDPTR[RST$L_HASH_FLINK];
;  868          0993  2         END;
```

```
;  869          0994  2
;  870          0995  2
;  871          0996  2      ! We are all done--return.
;  872          0997  2      !
;  873          0998  2      RETURN;
;  874          0999  2
;  875          1000  1      END;


                                    000C 00000          .ENTRY  DBG$RST_TEMP_RELEASE, Save R2,R3        ; 0937
                          53 00000000G  00   9E 00002   MOVAB   RST$TEMP_LIST, OLDPTR                   ; 0978
                          52            63   D0 00009 1$: MOVL   (OLDPTR), RSTPTR                      ; 0979
                                        18   13 0000C   BEQL   3$                                       ; 0980
                                    16  A2   B5 0000E   TSTW   22(RSTPTR)                               ; 0982
                                        0E   12 00011   BNEQ   2$                                       ;
                          63            62   D0 00013   MOVL   (RSTPTR), (OLDPTR)                      ; 0985
                                        52   DD 00016   PUSHL  RSTPTR                                  ; 0986
                 00000000G  00          01   FB 00018   CALLS  #1, DBG$REL_MEMORY                       ;
                                        E8   11 0001F   BRB    1$                                       ; 0982
                          53            52   D0 00021 2$: MOVL   RSTPTR, OLDPTR                        ; 0990
                                        E3   11 00024   BRB    1$                                       ; 0992
                                             04 00026 3$: RET                                           ; 1000

; Routine Size:  39 bytes,    Routine Base:  DBG$CODE + 02E6
```

```
;  877          1001  1 GLOBAL ROUTINE DBG$STA_ADDRESS_TO_REGDESCR(ADDRESS) =
;  878          1002  1 !
;  879          1003  1 !  FUNCTION
;  880          1004  1 !        This routine determines if a given address is a register address and
;  881          1005  1 !        returns a Register Descriptor if it is.  If the given address points
;  882          1006  1 !        into the DBG$REG_VALUES vector, it is a register address.  The register
;  883          1007  1 !        number so determined (plus a byte offset if any) and the scope number
;  884          1008  1 !        of the currently set context are combined in a "Register Descriptor"
;  885          1009  1 !        which is then returned to the caller.  (A Register Descriptor is always
;  886          1010  1 !        non-zero.)  If the address is not a register, zero is returned to the
;  887          1011  1 !        caller.
;  888          1012  1 !
;  889          1013  1 !  INPUTS
;  890          1014  1 !        ADDRESS - The input address which should be checked for being a
;  891          1015  1 !                  register address.
;  892          1016  1 !
;  893          1017  1 !  OUTPUTS
;  894          1018  1 !        If the given address is not a register address, zero is returned as the
;  895          1019  1 !                  routine value.  If it is a register address, a Register
;  896          1020  1 !                  Descriptor (which is always non-zero) is returned as the
;  897.         1021  1 !                  routine value.
;  898          1022  1 !
;  899          1023  1
;  900          1024  2     BEGIN
;  901          1025  2
;  902          1026  2     LOCAL
;  903          1027  2         REGDESCR: DBG$REGDESCR;          ! Register Descriptor that we build
;  904          1028  2
;  905          1029  2
;  906          1030  2
;  907          1031  2     ! If the address is not a register address, return zero right away.
;  908          1032  2     !
;  909          1033  2     IF (.ADDRESS LSSA DBG$REG_VALUES[0]) OR
;  910          1034  3        (.ADDRESS GEQA DBG$REG_VALUES[17])
;  911          1035  2     THEN
;  912          1036  2         RETURN 0;
;  913          1037  2
;  914          1038  2
;  915          1039  2     ! The address is a register address.  Build a Register Descriptor and
;  916          1040  2     ! return it to the caller.
;  917          1041  2     !
;  918          1042  2     REGDESCR[DBG$V_REGD_SENTINEL] = %X'2D';
;  919          1043  2     REGDESCR[DBG$V_REGD_OFFSET] = (.ADDRESS - DBG$REG_VALUES[0]) AND 3;
;  920          1044  2     REGDESCR[DBG$B_REGD_REGNUM] = (.ADDRESS - DBG$REG_VALUES[0])/%UPVAL;
;  921          1045  2     REGDESCR[DBG$W_REGD_SCOPENUM] = .DBG$SCOPE_NUMBER;
;  922          1046  2     RETURN .REGDESCR;
;  923          1047  2
;  924          1048  1     END;


                                 000C 00000          .ENTRY  DBG$STA_ADDRESS_TO_REGDESCR, Save R2,R3     ; 1001
                53 00000000G   00   9E 00002          MOVAB   DBG$REG_VALUES, R3                          ;
                50             63   9E 00009          MOVAB   DBG$REG_VALUES, R0                          ; 1033
                50       04    AC   D1 0000C          CMPL    ADDRESS, R0                                 ;
```

```
                                                 32  1F 00010          BLSSU   1$                                                          ;
                                        50       44  A3 9E 00012          MOVAB   DBG$REG_VALUES+68, R0                                       ; 1034
                                        50       04  AC D1 00016          CMPL    ADDRESS, R0                                                 ;
                                                 28  1E 0001A          BGEQU   1$                                                          ;
                51              06              02  2D F0 0001C          INSV    #45, #2, #6, REGDESCR                                       ; 1042
                                        50       63  9E 00021          MOVAB   DBG$REG_VALUES, R0                                          ; 1043
                                50      04  AC   50  C3 00024          SUBL3   R0, ADDRESS, R0                                             ;
                51              02          00   50  F0 00029          INSV    R0, #0, #2, REGDESCR                                        ;
                                52          50   04  C7 0002E          DIVL3   #4, R0, R2                                                  ; 1044
                51              08          08   52  F0 00032          INSV    R2, #8, #8, REGDESCR                                        ;
                51              10          10 00000000'  EF  F0 00037  INSV    DBG$SCOPE_NUMBER, #16, #16, REGDESCR                        ; 1045
                                        50       51  D0 00040          MOVL    REGDESCR, R0                                                ; 1046
                                                 04  00043          RET                                                                 ;
                                                 50  D4 00044  1$:     CLRL    R0                                                          ; 1048
                                                 04  00046          RET                                                                 ;

; Routine Size:  71 bytes,    Routine Base:  DBG$CODE + 030D
```

```
;  926          1049  1 GLOBAL ROUTINE DBG$STA_GETSOURCEMOD(MODNAMEPTR) =
;  927          1050  1 !
;  928          1051  1 ! FUNCTION
;  929          1052  1 !       This routine looks up what module should be used when displaying source
;  930          1053  1 !       lines.  It accepts a pointer to a Counted ASCII module name and returns
;  931          1054  1 !       a pointer to the corresponding Module RST Entry.  However, if the name
;  932          1055  1 !       pointer is zero, it determines which module contains the current scope
;  933          1056  1 !       (as defined by the Scope List) and returns a pointer to that module's
;  934          1057  1 !       Module RST Entry.  If the module name does not exist or if no known
;  935          1058  1 !       module contains the current scope, the routine returns a zero value.
;  936          1059  1 !
;  937          1060  1 !       This routine is called during the processing of the TYPE command to
;  938          1061  1 !       determine which module to type source lines from.  It is also called
;  939          1062  1 !       during the processing of the SET SOURCE/MODULE and CANCEL SOURCE/MODULE
;  940          1063  1 !       commands to look up module names.  Only the TYPE command passes a zero
;  941          1064  1 !       module name pointer; this happens when no module name is specified on
;  942          1065  1 !       the command.
;  943          1066  1 !
;  944          1067  1 ! INPUTS
;  945          1068  1 !       MODNAMEPTR - A pointer to the Counted ASCII module name to be looked up.
;  946          1069  1 !                    If the module of the current scope is to be looked up, this
;  947          1070  1 !                    pointer should be zero.
;  948          1071  1 !
;  949          1072  1 ! OUTPUTS
;  950          1073  1 !       A pointer to the Module RST Entry of the module specified by MODNAMEPTR
;  951          1074  1 !       is returned as the routine value.  If the desired module could
;  952          1075  1 !       not be found (no such module name or current scope not in any
;  953          1076  1 !       known module), zero is returned as the value.
;  954          1077  1 !
;  955          1078  1
;  956          1079  2     BEGIN
;  957          1080  2
;  958          1081  2     LOCAL
;  959          1082  2         INVOCNUM,                       ! Invocation number parameter
;  960          1083  2         MODRSTPTR: REF RST$ENTRY,       ! Pointer to found Module RST Entry
;  961          1084  2         SCOPE,                          ! Scope pointer parameter
;  962          1085  2         SCOPEPTR: REF SCOPE$ENTRY;      ! Pointer to current Scope List Entry
;  963          1086  2
;  964          1087  2
;  965          1088  2
;  966          1089  2     ! If the MODNAMEPTR parameter is non-zero, we search the RST Hash Table for
;  967          1090  2     ! the Counted ASCII module name pointed to by MODNAMEPTR.
;  968          1091  2     !
;  969          1092  2     IF .MODNAMEPTR NEQ 0
;  970          1093  2     THEN
;  971          1094  3         BEGIN
;  972          1095  3         DBG$HASH_FIND_SETUP(.MODNAMEPTR);
;  973          1096  3         WHILE TRUE DO
;  974          1097  4             BEGIN
;  975          1098  4             MODRSTPTR = DBG$HASH_FIND(.MODNAMEPTR);
;  976          1099  4             IF .MODRSTPTR EQL 0 THEN RETURN 0;
;  977          1100  4             IF .MODRSTPTR[RST$B_KIND] EQL RST$K_MODULE THEN RETURN .MODRSTPTR;
;  978          1101  3             END;
;  979          1102  3
;  980          1103  2         END;
;  981          1104  2
;  982          1105  2
```

```
;  983          1106  2     ! MODNAMEPTR is zero.  We thus search the Scope List for the first scope
;  984          1107  2     ! with a known module and return a pointer to that Module RST Entry.
;  985          1108  2     !
;  986          1109  2     SCOPEPTR = .SCOPE$LIST;
;  987          1110  2     WHILE .SCOPEPTR NEQ 0 DO
;  988          1111  3         BEGIN
;  989          1112  3         CASE .SCOPEPTR[SCOPE$L_STATE] FROM SCOPE$K_NORMAL TO SCOPE$K_SETMODS OF
;  990          1113  3             SET
;  991          1114  3
;  992          1115  3
;  993          1116  3             ! Normal scope--just return the scope's Module RST Entry pointer.
;  994          1117  3             !
;  995          1118  3             [SCOPE$K_NORMAL]:
;  996          1119  3                 RETURN .SCOPEPTR[SCOPE$L_MODPTR];
;  997          1120  3
;  998          1121  3
;  999          1122  3             ! Numbered scope--look up the corresponding lexical entity and
; 1000          1123  3             ! module in the call stack and return its Module RST Entry pointer.
; 1001          1124  3             ! If the module is not found, we continue the Scope List search.
; 1002          1125  3             !
; 1003          1126  3             [SCOPE$K_NUMBERED]:
; 1004          1127  4                 BEGIN
; 1005          1128  4                 DBG$STA_NUMBERED_SCOPE(.SCOPEPTR[SCOPE$L_MODPTR], MODRSTPTR,
; 1006          1129  4                                                   SCOPE, INVOCNUM);
; 1007          1130  4                 IF .MODRSTPTR NEQ 0 THEN RETURN .MODRSTPTR;
; 1008          1131  3                 END;
; 1009          1132  3
; 1010          1133  3
; 1011          1134  3             ! Global symbol scope--just ignore this entry and continue search.
; 1012          1135  3             !
; 1013          1136  3             [SCOPE$K_GLOBAL]:
; 1014          1137  3                 0;
; 1015          1138  3
; 1016          1139  3
; 1017          1140  3             ! All SET modules scope--ignore this entry and continue search.
; 1018          1141  3             !
; 1019          1142  3             [SCOPE$K_SETMODS]:
; 1020          1143  3                 0;
; 1021          1144  3
; 1022          1145  3             TES;
; 1023          1146  3
; 1024          1147  3
; 1025          1148  3         ! Link to the next Scope List Entry and loop.
; 1026          1149  3         !
; 1027          1150  3         SCOPEPTR = .SCOPEPTR[SCOPE$L_FLINK];
; 1028          1151  3         END;
; 1029          1152  2
; 1030          1153  2
; 1031          1154  2     ! No usable scope was found in the Scope List.  Return zero to the caller.
; 1032          1155  2     !
; 1033          1156  2     RETURN 0;
; 1034          1157  2
; 1035          1158  1     END;
```

```
                                        0004 00000          .ENTRY  DBG$STA_GETSOURCEMOD, Save R2                    ; 1049
                                    5E  0C  C2 00002        SUBL2   #12, SP                                         ;
                                    52  04  AC D0 00005     MOVL    MODNAMEPTR, R2                                  ; 1092
                                        1F  13 00009        BEQL    2$                                              ;
                                        52  DD 0000B        PUSHL   R2                                              ; 1095
                          00000000G     00  01 FB 0000D     CALLS   #1, DBG$HASH_FIND_SETUP                         ;
                                        52  DD 00014 1$:    PUSHL   R2                                              ; 1098
                          00000000G     00  01 FB 00016     CALLS   #1, DBG$HASH_FIND                               ;
                                08      AE  50 D0 0001D     MOVL    R0, MODRSTPTR                                   ;
                                        41  13 00021        BEQL    8$                                              ; 1099
                                    01  14  A0 91 00023     CMPB    20(R0), #1                                      ; 1100
                                        EB  12 00027        BNEQ    1$                                              ;
                                            04 00029        RET                                                     ;
                                    52 00000000G    00  D0 0002A 2$:    MOVL    SCOPE$LIST, SCOPEPTR                ; 1109
                                        31  13 00031 3$:    BEQL    8$                                              ; 1110
                                03      01  04  A2 CF 00033        CASEL   4(SCOPEPTR), #1, #3                     ; 1112
                0027    0027        000D        0008        00038 4$:    .WORD   5$-4$,-                             ;
                                                                                6$-4$,-                             ;
                                                                                7$-4$,-                             ;
                                                                                7$-4$                               ;
                                    50  0C  A2 D0 00040 5$:    MOVL    12(SCOPEPTR), R0                            ; 1119
                                            04 00044        RET                                                     ;
                                        5E  DD 00045 6$:    PUSHL   SP                                              ; 1128
                                    08  AE  9F 00047        PUSHAB  SCOPE                                           ;
                                    10  AE  9F 0004A        PUSHAB  MODRSTPTR                                       ;
                                    0C  A2  DD 0004D        PUSHL   12(SCOPEPTR)                                    ;
                          0000V     CF      04 FB 00050     CALLS   #4, DBG$STA_NUMBERED_SCOPE                      ;
                                    08  AE  D5 00055        TSTL    MODRSTPTR                                       ; 1130
                                        05  13 00058        BEQL    7$                                              ;
                                    50  08  AE D0 0005A     MOVL    MODRSTPTR, R0                                   ;
                                            04 0005E        RET                                                     ;
                                    52          62  D0 0005F 7$:    MOVL    (SCOPEPTR), SCOPEPTR                    ; 1150
                                                CD  11 00062        BRB     3$                                      ; 1110
                                    50          D4  00064 8$:    CLRL    R0                                      ; 1158
                                                04  00066        RET                                             ;

; Routine Size:  103 bytes,    Routine Base:  DBG$CODE + 0354
```

```
;  1037     1159  1 GLOBAL ROUTINE DBG$STA_GETSYMBOL(PATHNAME, SYMID, KIND,
;  1038     1160  1                  OUT_SCOPE_STATE, OUT_SCOPE, ARRAY_FLAG,
;  1039     1161  1                  TYPE_FLAG): NOVALUE =
;  1040     1162  1 !
;  1041     1163  1 ! FUNCTION:
;  1042     1164  1 !       This routine accepts a pathname and returns the corresponding symbol.
;  1043     1165  1 !       The pathname, which is passed in internal format, consists of a symbolic
;  1044     1166  1 !       name (such as "X") or a symbolic name with pathname qualification (such
;  1045     1167  1 !       as "M\R\X").  It also includes any data record qualification which may
;  1046     1168  1 !       be present; thus "M\R\A.B.C" constitutes a pathname in this context.
;  1047     1169  1 !       This routine is the central routine one calls to search the Debug Symbol
;  1048     1170  1 !       Table (the DST) to find the symbol table entry corresponding to a given
;  1049     1171  1 !       symbolic name.  The search takes into account all scope rules dictated
;  1050     1172  1 !       by the language and the SET SCOPE and SET MODULE commands.
;  1051     1173  1 !
;  1052     1174  1 ! INPUTS:
;  1053     1175  1 !       PATHNAME - The address of a pathname descriptor describing the symbolic
;  1054     1176  1 !                  name to be looked up in the DST.  A "pathname descriptor" is
;  1055     1177  1 !                  the internal data structure which describes an already parsed
;  1056     1178  1 !                  symbolic name including all pathname and data record qualifi-
;  1057     1179  1 !                  cation.
;  1058     1180  1 !
;  1059     1181  1 !       SYMID    - The address of a longword location where the "symbol identi-
;  1060     1182  1 !                  fier" should be returned.  The "symbol identifier" is a value
;  1061     1183  1 !                  which uniquely identifies the returned symbol.  This value is
;  1062     1184  1 !                  not directly understood outside the symbol table access rou-
;  1063     1185  1 !                  tines, but can be passed to various other symbol table access
;  1064     1186  1 !                  routines to extract information about the symbol.
;  1065     1187  1 !
;  1066     1188  1 !       KIND     - The address of a longword location where the "kind" of the
;  1067     1189  1 !                  SYMID symbol should be returned.  KIND specifies whether SYMID
;  1068     1190  1 !                  identifies a routine, a line, or a data item, etc.  See the
;  1069     1191  1 !                  OUTPUTS section below for more detail.
;  1070     1192  1 !
;  1071     1193  1 !       OUT_SCOPE_STATE -           If not zero, the caller wishes to have
;  1072     1194  1 !                                   passed back to him the scope state
;  1073     1195  1 !                                   (e.g., NORMAL, SETMODS, ...) in which
;  1074     1196  1 !                                   the lookup succeeded.
;  1075     1197  1 !
;  1076     1198  1 !       OUT_SCOPE -             If not zero, the caller wishes to have passed
;  1077     1199  1 !                               back to him the scope in which the lookup
;  1078     1200  1 !                               of the symbol succeeded.
;  1079     1201  1 !
;  1080     1202  1 !       ARRAY_FLAG -    Indicates that this symbol lookup was
;  1081     1203  1 !                       called as part of processing a subscripted symbol.
;  1082     1204  1 !                       This information is used in BASIC to disambiguate
;  1083     1205  1 !                       symbol references. That is, in BASIC, you can have
;  1084     1206  1 !                       2 symbols named X, one an array and one not, and
;  1085     1207  1 !                       the language uses context to tell them apart.
;  1086     1208  1 !
;  1087     1209  1 !       TYPE_FLAG -     Indicates that it is OK to return a RSTPTR whose
;  1088     1210  1 !                       kind is "TYPE".
;  1089     1211  1 !
;  1090     1212  1 ! OUTPUTS:
;  1091     1213  1 !       SYMID    - A symbol identifier which uniquely identifies the symbol spec-
;  1092     1214  1 !                  ified by PATHNAME is returned to SYMID.  This symbol identi-
;  1093     1215  1 !                  fier can then be passed to any symbol table access routine
```

```
;  1094          1216  1 !                   which accepts a SYMID parameter.  If no unique symbol corre-
;  1095          1217  1 !                   sponding to PATHNAME can be found in the DST (given the scope
;  1096          1218  1 !                   rules in effect), a zero is returned to SYMID.
;  1097          1219  1 !
;  1098          1220  1 !               KIND    - The "kind" of the SYMID symbol is returned to KIND.  This is
;  1099          1221  1 !                   a small integer value with the following possible values:
;  1100          1222  1 !
;  1101          1223  1 !                         RST$K_INVALID   -- No symbol was found (SYMID = 0)
;  1102          1224  1 !                         RST$K_NOTUNIQUE -- Symbol is not unique (SYMID = 0)
;  1103          1225  1 !                         RST$K_ROUTINE   -- SYMID is a Routine
;  1104          1226  1 !                         RST$K_BLOCK     -- SYMID is a Block
;  1105          1227  1 !                         RST$K_ENTRY     -- SYMID is an Entry Point
;  1106          1228  1 !                         RST$K_LABEL     -- SYMID is a Label
;  1107          1229  1 !                         RST$K_LINE      -- SYMID is a Line
;  1108          1230  1 !                         RST$K_DATA      -- SYMID is a Data Item
;  1109          1231  1 !                         RST$K_TYPCOMP   -- SYMID is a Data Type Component
;  1110          1232  1 !
;  1111          1233  1 !               No value is returned by DBG$STA_GETSYMBOL.
;  1112          1234  1 !
;  1113          1235  1
;  1114          1236  2     BEGIN
;  1115          1237  2
;  1116          1238  2     MAP
;  1117          1239  2         PATHNAME: REF PTH$PATHNAME,      ! Pointer to input pathname descriptor
;  1118          1240  2         SYMID: REF VECTOR[1],            ! Pointer to SYMID location
;  1119          1241  2         KIND: REF VECTOR[1];             ! Pointer to KIND location
;  1120          1242  2
;  1121          1243  2     LITERAL
;  1122          1244  2         MAX_STACK = 100;                 ! Maximum size of the symbol name stack
;  1123          1245  2
;  1124          1246  2     FIELD STK_FLDS =                     ! Field definitions for SYMSTACK vector
;  1125          1247  2         SET                              !
;  1126          1248  2         STK_RSTPTR      = [ 0, L_ ],     ! RST pointer to current stack component
;  1127          1249  2         STK_PINDEX      = [ 1, W0_ ],    ! Pathname vector index + 1
;  1128          1250  2         STK_TPINDEX     = [ 1, W1_ ]     ! Next Type RST Entry ref table index
;  1129          1251  2         TES;
;  1130          1252  2
;  1131          1253  2     OWN
;  1132          1254  2         CANDLST: REF VECTOR[,LONG]       ! Pointer to RST entry candidate list
;  1133          1255  2                  INITIAL(0),             !      for the current scope
;  1134          1256  2         MODU_SCOPE: SCOPE$ENTRY          ! Scope list entry used for explicitly
;  1135          1257  2                 INITIAL(0, SCOPE$K_NORMAL, 0, 0),      ! specified module scope
;  1136          1258  2         NORM_SCOPE: SCOPE$ENTRY          ! Scope list entry used for explicitly
;  1137          1259  2                 INITIAL(0, SCOPE$K_NORMAL, 0, 0),      ! specified scopes
;  1138          1260  2         NUMB_SCOPE: SCOPE$ENTRY          ! Scope list entry used for numbered
;  1139          1261  2                 INITIAL (0, SCOPE$K_NUMBERED, 0, 0);   ! scopes (i.e., n\X).
;  1140          1262  2
;  1141          1263  2     LOCAL
;  1142          1264  2         ARR_FLAG,                        ! TRUE if symbol is subscripted
;  1143          1265  2         CANDBLK: REF CAND_BLOCKVECTOR,   ! Pointer to candidate block-vector
;  1144          1266  2         DEFDEPTH,                        ! Definition depth of symbol in scope
;  1145          1267  2         FIRST_MODPTR,                    ! Pointer to first module on scope list
;  1146          1268  2         GOOD_CAND,                       ! CANDLST index of good candidate symbol
;  1147          1269  2         HAVE_LINE_NUM,                   ! Flag set if pathname has a line number
;  1148          1270  2         HAVE_NUM_SCOPE,                  ! Flag set if pathname has a numbered
;  1149          1271  2                                          !      scope in first position ("0\I")
;  1150          1272  2         HAVE_SCOPE,                      ! Flag set when we have scope to search
```

```
;  1151     1273  2        IN_SCOPE,                       ! Flag set if symbol is in current scope
;  1152     1274  2        J,                              ! Loop index for CANDBLK vector
;  1153     1275  2        LINEEND,                        ! Line number end address
;  1154     1276  2        LINE_LEX_PTR,                   ! Pointer to the inner-most lexical
;  1155     1277  2                                        !     entity containing the line number
;  1156     1278  2        LINE_NUM,                       ! Line number if pathname contains one
;  1157     1279  2        LINE_NUM_IS_LAST,               ! Flag set if there is a line number and
;  1158     1280  2                                        !     it is last in the pathname
;  1159     1281  2        LINE_NUM_LOC,                   ! Index of line number (if present) in
;  1160     1282  2                                        !     pathname vector (1-based).
;  1161     1283  2        LINESTART,                      ! Line number start address
;  1162     1284  2        MODRSTPTR: REF RST$ENTRY,       ! Pointer to Module RST Entry for the
;  1163     1285  2                                        !     current scope being searched
;  1164     1286  2        NAMEPTR: REF VECTOR[,BYTE],     ! Pointer to RST entry symbol name as
;  1165     1287  2                                        !     a counted ASCII string
;  1166     1288  2        NCANDS,                         ! Number of candidate list entries
;  1167     1289  2        NEWREFLIST,                     ! Temporary pointer to new RST Reference
;  1168     1290  2                                        !     List memory block
;  1169     1291  2        NEXTSETMOD: REF RST$ENTRY,      ! Pointer to the next SET module after
;  1170     1292  2                                        !     this one--used when searching all
;  1171     1293  2                                        !     SET modules for a pathname match
;  1172     1294  2        NUMBER,                         ! Used to convert line number to binary
;  1173     1295  2        NUMSCP_INVOC_NUM,               ! Invocation number of the current
;  1174     1296  2                                        !     numbered scope
;  1175     1297  2        OLDCAND,                        ! Pointer to candidate list about to be
;  1176     1298  2                                        !     copied to a larger memory block
;  1177     1299  2        PATH_NAME_PTR,                  ! Pointer to pathname counted ASCII
;  1178     1300  2        PATH_START_LOC,                 ! Start location of scope in pathname
;  1179     1301  2        PATHSTRING,                     ! Pointer to pathname counted ASCII
;  1180     1302  2        PATHVEC: REF VECTOR[,LONG],     ! Pointer to the pathname vector
;  1181     1303  2        PINDEX,                         ! Index into pathname vector
;  1182     1304  2        PNAME: REF VECTOR[,BYTE],       ! Pointer to pathname component counted
;  1183     1305  2                                        !     ASCII string
;  1184     1306  2        REGISTER_SYMID: REF RST$ENTRY,  ! SYMID for register name (such as %R5)
;  1185     1307  2        REG_LINE_LEX_PTR,               ! Same as LINE_LEX_PTR but for the scope
;  1186     1308  2                                        !     in which registers are looked up
;  1187     1309  2        REG_SCOPE,                      ! Set to TRUE if current scope is scope
;  1188     1310  2                                        !     in which registers are looked up
;  1189     1311  2        RNAME: REF VECTOR[,BYTE],       ! Pointer to RST entry scope chain com-
;  1190     1312  2                                        !     ponent's name as counted ASCII
;  1191     1313  2        ROUTPTR: REF RST$ENTRY,         ! Pointer to Routine RST Entry of rout-
;  1192     1314  2                                        !     ine with invocation number
;  1193     1315  2        RPTR: REF RST$ENTRY,            ! Pointer to current RST entry in RSTPTR
;  1194     1316  2                                        !     entry's up-scope chain
;  1195     1317  2        RSTPTR: REF RST$ENTRY,          ! Pointer to candidate RST entry
;  1196     1318  2        SATPTR: REF SAT$ENTRY,          ! Pointer to Static Address Table entry
;  1197     1319  2        SCOPE: REF RST$ENTRY,           ! Pointer to current scope's RST entry
;  1198     1320  2        SCOPEPTR: REF SCOPE$ENTRY,      ! Points to the current scope list entry
;  1199     1321  2        SCOPE_START_PTR,                ! Pointer to start of scope list actual-
;  1200     1322  2                                        !     ly searched--used for registers
;  1201     1323  2        SCOPE_STATE,                    ! The current state in our traversal of
;  1202     1324  2                                        !     the scopes to be searched
;  1203     1325  2        SCPTR: REF RST$ENTRY,           ! Pointer used to follow current scope's
;  1204     1326  2                                        !     up-scope chain
;  1205     1327  2        SET_SCOPE,                      ! Set to TRUE if called by SET SCOPE
;  1206     1328  2        STATUS,                         ! Status code returned by called routine
;  1207     1329  2        STKPTR,                         ! Current SYMSTACK index
```

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;  1208          1330  2          STMT_NUM,                       ! Statement number within line number
;  1209          1331  2          SYMSCOPE: REF RST$ENTRY,        ! The actual scope of the current symbol
;  1210          1332  2          SYMSTACK:                       ! Symbol name stack for name components
;  1211          1333  2                  BLOCKVECTOR[MAX_STACK, 2, LONG] FIELD(STK_FLDS), !
;  1212          1334  2          TPINDEX,                        ! Index into a Type RST Entry's table of
;  1213          1335  2                                          !     references to that type
;  1214          1336  2          TPTR: REF VECTOR[,LONG],        ! Pointer to the Type RST Entry refer-
;  1215          1337  2                                          !     ence table
;  1216          1338  2          VALID_LINE_FLAG;                ! Flag set if line number is valid
;  1217          1339  2
;  1218          1340  2
;  1219          1341  2      ! Note whether we were called by the SET scope command.
;  1220          1342  2      !
;  1221          1343  2      SET_SCOPE = .RST$SET_SCOPE;
;  1222          1344  2      RST$SET_SCOPE = FALSE;
;  1223          1345  2
;  1224          1346  2
;  1225          1347  2      ! Set up pointers to the pathname descriptor's pathname vector and the last
;  1226          1348  2      ! name in the pathname vector.
;  1227          1349  2      !
;  1228          1350  2      PATHVEC = PATHNAME[PTH$A_PATHVECTOR];
;  1229          1351  2      NAMEPTR = .PATHVEC[.PATHNAME[PTH$B_TOTCNT] - 1];
;  1230          1352  2
;  1231          1353  2
;  1232          1354  2      ! See if there is any line number reference in the pathname.  If there is,
;  1233          1355  2      ! extract the line and statement numbers and set the HAVE_LINE_NUM flag.
;  1234          1356  2      !
;  1235          1357  2      HAVE_LINE_NUM = FALSE;
;  1236          1358  2      LINE_NUM_IS_LAST = FALSE;
;  1237          1359  2      LINE_NUM_LOC = 0;
;  1238          1360  2      VALID_LINE_FLAG = TRUE;
;  1239          1361  2      INCR I FROM 1 TO .PATHNAME[PTH$B_TOTCNT] DO
;  1240          1362  2          BEGIN
;  1241          1363  3          PNAME = .PATHVEC[.I - 1];
;  1242          1364  3          IF (.PNAME[0] GTR 6) AND
;  1243          1365  3             CH$EQL(6, PNAME[1], 6, UPLIT BYTE(%ASCII '%LINE '), 0)
;  1244          1366  3          THEN
;  1245          1367  4              BEGIN
;  1246          1368  4              IF .PNAME[7] LSS '0' OR .PNAME[7] GTR '9' THEN VALID_LINE_FLAG = FALSE;
;  1247          1369  4              IF .HAVE_LINE_NUM THEN VALID_LINE_FLAG = FALSE;
;  1248          1370  4              HAVE_LINE_NUM = TRUE;
;  1249          1371  4              LINE_NUM_LOC = .I;
;  1250          1372  4
;  1251          1373  4
;  1252          1374  4              ! Loop over the line number ASCII to pick up the actual line number
;  1253          1375  4              ! and statement number.
;  1254          1376  4              !
;  1255          1377  4              LINE_NUM = -1;
;  1256          1378  4              NUMBER = 0;
;  1257          1379  4              INCR I FROM 7 TO .PNAME[0] DO
;  1258          1380  5                  BEGIN
;  1259          1381  5                  IF .PNAME[.I] EQL '.' AND .LINE_NUM EQL -1
;  1260          1382  5                  THEN
;  1261          1383  6                      BEGIN
;  1262          1384  6                      LINE_NUM = .NUMBER;
;  1263          1385  6                      NUMBER = 0;
;  1264          1386  6
```

```
;  1265     1387  6                END
;  1266     1388  6
;  1267     1389  5            ELSE IF (.PNAME[.I] GEQ '0') AND (.PNAME[.I] LEQ '9') AND
;  1268     1390  6                    (.NUMBER LEQ 1000000)
;  1269     1391  5            THEN
;  1270     1392  6                NUMBER = 10*.NUMBER + (.PNAME[.I] - '0')
;  1271     1393  6
;  1272     1394  5            ELSE
;  1273     1395  6                BEGIN
;  1274     1396  6                VALID_LINE_FLAG = FALSE;
;  1275     1397  6                EXITLOOP;
;  1276     1398  5                END;
;  1277     1399  5
;  1278     1400  4            END;
;  1279     1401  4
;  1280     1402  4
;  1281     1403  4        ! Set LINE_NUM and STMT_NUM properly on loop exit.
;  1282     1404  4        !
;  1283     1405  4        IF .LINE_NUM EQL -1
;  1284     1406  4        THEN
;  1285     1407  5            BEGIN
;  1286     1408  5            LINE_NUM = .NUMBER;
;  1287     1409  5            STMT_NUM = 0;
;  1288     1410  5            END
;  1289     1411  5
;  1290     1412  4        ELSE
;  1291     1413  4            STMT_NUM = .NUMBER;
;  1292     1414  4
;  1293     1415  3            END;
;  1294     1416  3
;  1295     1417  2        END;                                ! End of line number INCR loop
;  1296     1418  2
;  1297     1419  2
;  1298     1420  2    ! If we got a line number, make some additional validity checks on it.
;  1299     1421  2    ! If the line number is not valid for any reason (including syntax errors),
;  1300     1422  2    ! return the invalid symbol code to the caller.
;  1301     1423  2    !
;  1302     1424  2    IF .HAVE_LINE_NUM
;  1303     1425  2    THEN
;  1304     1426  3        BEGIN
;  1305     1427  3        LINE_NUM_IS_LAST = .LINE_NUM_LOC EQL .PATHNAME[PTH$B_TOTCNT];
;  1306     1428  3        IF (.LINE_NUM_LOC GTR .PATHNAME[PTH$B_PATHCNT])     OR
;  1307     1429  3           (.LINE_NUM_LOC LSS .PATHNAME[PTH$B_PATHCNT] - 1) OR
;  1308     1430  4           (.LINE_NUM_LOC EQL .PATHNAME[PTH$B_PATHCNT] AND NOT .LINE_NUM_IS_LAST)
;  1309     1431  3        THEN
;  1310     1432  3            VALID_LINE_FLAG = FALSE;
;  1311     1433  3
;  1312     1434  3        IF NOT .VALID_LINE_FLAG
;  1313     1435  3        THEN
;  1314     1436  4            BEGIN
;  1315     1437  4            SYMID[0] = 0;
;  1316     1438  4            KIND[0] = RST$K_INVALID;
;  1317     1439  4            RETURN;
;  1318     1440  3            END;
;  1319     1441  3
;  1320     1442  2        END;
;  1321     1443  2
```

```
;  1322     1444  2
;  1323     1445  2      ! If we do not yet have a candidate list memory block, get one and initial-
;  1324     1446  2      ! ize its first element to give the list size that will fit in the block.
;  1325     1447  2      !
;  1326     1448  2      NCANDS = 0;
;  1327     1449  2      IF .CANDLST EQL 0
;  1328     1450  2      THEN
;  1329     1451  3          BEGIN
;  1330     1452  3          CANDLST = DBG$GET_MEMORY(11);
;  1331     1453  3          CANDLST[0] = 10;
;  1332     1454  3          END;
;  1333     1455  2
;  1334     1456  2
;  1335     1457  2      ! Set up the "scope pointer" to point to the list of scopes to be searched.
;  1336     1458  2      ! If the symbol is of the form \X, we search the Global Symbol Table only,
;  1337     1459  2      ! and if it is of the form n\X, we search the n-th "numbered scope" only.
;  1338     1460  2      ! Otherwise, we use the normal scope list given by SCOPE$LIST.
;  1339     1461  2      !
;  1340     1462  2      SCOPEPTR = .SCOPE$LIST;
;  1341     1463  2      HAVE_NUM_SCOPE = FALSE;
;  1342     1464  2      PNAME = .PATHVEC[0];
;  1343     1465  2      IF .PNAME[0] EQL 0
;  1344     1466  2      THEN
;  1345     1467  3          BEGIN
;  1346     1468  3          IF .PATHNAME[PTH$B_LOCINVOC] EQL 0
;  1347     1469  3          THEN
;  1348     1470  3              SCOPEPTR = UPLIT(0, SCOPE$K_GLOBAL, 0, 0)
;  1349     1471  3
;  1350     1472  3          ELSE IF .PATHNAME[PTH$B_LOCINVOC] EQL 1
;  1351     1473  3          THEN
;  1352     1474  4              BEGIN
;  1353     1475  4              HAVE_NUM_SCOPE = TRUE;
;  1354     1476  4              SCOPEPTR = NUMB_SCOPE;
;  1355     1477  4              SCOPEPTR[SCOPE$L_MODPTR] = .PATHNAME[PTH$L_INVOCNUM];
;  1356     1478  4              IF .PATHNAME[PTH$B_PATHCNT] LSS 2 THEN SCOPEPTR = 0;
;  1357     1479  4              END
;  1358     1480  4
;  1359     1481  3          ELSE
;  1360     1482  3              $DBG_ERROR('RSTACCESS\GETSYMBOL');
;  1361     1483  3
;  1362     1484  3          END
;  1363     1485  2
;  1364     1486  2
;  1365     1487  2      ! If there is pathname qualification on the variable name other than the
;  1366     1488  2      ! global scope or a numbered scope, we determine what scope is specified
;  1367     1489  2      ! and set up a scope list entry for that scope.
;  1368     1490  2      !
;  1369     1491  2      ELSE IF (.PATHNAME[PTH$B_PATHCNT] GTR 1) AND (.LINE_NUM_LOC NEQ 1)
;  1370     1492  2      THEN
;  1371     1493  3          BEGIN
;  1372     1494  3          PATH_START_LOC = .PATHNAME[PTH$B_PATHCNT] - 1;
;  1373     1495  3          IF .LINE_NUM_LOC EQL .PATH_START_LOC
;  1374     1496  3          THEN
;  1375     1497  4              PATH_START_LOC = .PATH_START_LOC - 1;
;  1376     1498  3
;  1377     1499  3
;  1378     1500  3          ! Loop over the RST Hash Table chain for this symbol name (i.e., for the
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```
;  1379     1501  3          ! scope specified by the pathname).  For each such symbol, see if it
;  1380     1502  3          ! matches the rest of the pathname qualification.
;  1381     1503  3          !
;  1382     1504  3          MODU_SCOPE[SCOPE$L_RSTPTR] = 0;
;  1383     1505  3          NORM_SCOPE[SCOPE$L_RSTPTR] = 0;
;  1384     1506  3          PATH_NAME_PTR = .PATHVEC[.PATH_START_LOC - 1];
;  1385     1507  3          DBG$HASH_FIND_SETUP(.PATH_NAME_PTR);
;  1386     1508  3          WHILE TRUE DO
;  1387     1509  4              BEGIN
;  1388     1510  4
;  1389     1511  4
;  1390     1512  4              ! Get the next symbol from the hash chain.  Check for chain's end.
;  1391     1513  4              !
;  1392     1514  4              RSTPTR = DBG$HASH_FIND(.PATH_NAME_PTR);
;  1393     1515  4              IF .RSTPTR EQL 0 THEN EXITLOOP;
;  1394     1516  4
;  1395     1517  4
;  1396     1518  4              ! Scan the symbol's up-scope chain and see if it fully matches the
;  1397     1519  4              ! specified pathname qualification.  If so, this is the scope.
;  1398     1520  4              !
;  1399     1521  4              RPTR = .RSTPTR;
;  1400     1522  4              PINDEX = .PATH_START_LOC;
;  1401     1523  4              WHILE TRUE DO
;  1402     1524  5                  BEGIN
;  1403     1525  5                  IF .RSTPTR[RST$V_GLOBAL] THEN EXITLOOP;
;  1404     1526  5                  IF (.RSTPTR[RST$B_KIND] NEQ RST$K_MODULE)  AND
;  1405     1527  5                     (.RSTPTR[RST$B_KIND] NEQ RST$K_ROUTINE) AND
;  1406     1528  5                     (.RSTPTR[RST$B_KIND] NEQ RST$K_BLOCK) AND
;  1407     1529  6                     (.RSTPTR[RST$B_KIND] NEQ RST$K_TYPE)
;  1408     1530  5                  THEN
;  1409     1531  5                      EXITLOOP;
;  1410     1532  5
;  1411     1533  5                  PNAME = .PATHVEC[.PINDEX - 1];
;  1412     1534  5                  RNAME = DBG$GET_DST_NAME(.RPTR[RST$L_DSTPTR]);
;  1413     1535  5                  IF CH$EQL(.PNAME[0], PNAME[1], .RNAME[0], RNAME[1], 0)
;  1414     1536  5                  THEN
;  1415     1537  6                      BEGIN
;  1416     1538  6
;  1417     1539  6
;  1418     1540  6                      ! If the pathname ended and everything matched so far, this
;  1419     1541  6                      ! may be the desired scope.  Create a scope list entry for
;  1420     1542  6                      ! it and check for uniqueness.
;  1421     1543  6                      !
;  1422     1544  6                      IF .PINDEX EQL 1
;  1423     1545  6                      THEN
;  1424     1546  7                          BEGIN
;  1425     1547  7                          MODRSTPTR = .RSTPTR;
;  1426     1548  7                          WHILE .MODRSTPTR[RST$B_KIND] NEQ RST$K_MODULE DO
;  1427     1549  7                              MODRSTPTR = .MODRSTPTR[RST$L_UPSCOPEPTR];
;  1428     1550  7
;  1429     1551  7                          SCOPEPTR = NORM_SCOPE;
;  1430     1552  7                          IF .RSTPTR EQL .MODRSTPTR THEN SCOPEPTR = MODU_SCOPE;
;  1431     1553  7                          IF .SCOPEPTR[SCOPE$L_RSTPTR] NEQ 0
;  1432     1554  7                          THEN
;  1433     1555  8                              BEGIN
;  1434     1556  8                              SYMID[0] = 0;
;  1435     1557  8                              KIND[0] = RST$K_NOTUNIQUE;
```

```
;  1436     1558  8                        RETURN;
;  1437     1559  7                        END;
;  1438     1560  7
;  1439     1561  7                    SCOPEPTR[SCOPE$L_RSTPTR] = .RSTPTR;
;  1440     1562  7                    SCOPEPTR[SCOPE$L_MODPTR] = .MODRSTPTR;
;  1441     1563  7                    EXITLOOP;
;  1442     1564  6                    END;
;  1443     1565  6
;  1444     1566  6
;  1445     1567  6                ! Decrement the PATHVEC index and continue the search.
;  1446     1568  6                !
;  1447     1569  6                PINDEX = .PINDEX - 1;
;  1448     1570  5                END;
;  1449     1571  5
;  1450     1572  5
;  1451     1573  5            ! Link up-scope and continue the search.
;  1452     1574  5            !
;  1453     1575  5            IF .RPTR[RST$B_KIND] EQL RST$K_MODULE THEN EXITLOOP;
;  1454     1576  5            RPTR = .RPTR[RST$L_UPSCOPEPTR];
;  1455     1577  4            END;
;  1456     1578  4
;  1457     1579  3        END;                        ! End of WHILE loop over hash table
;  1458     1580  3
;  1459     1581  3
;  1460     1582  3    ! Depending on whether a normal scope or a module scope or both were
;  1461     1583  3    ! found to match the pathname, put the corresponding scope list entries
;  1462     1584  3    ! on the scope list.
;  1463     1585  3    !
;  1464     1586  3    SCOPEPTR = 0;
;  1465     1587  3    MODU_SCOPE[SCOPE$L_FLINK] = 0;
;  1466     1588  3    IF .NORM_SCOPE[SCOPE$L_RSTPTR] NEQ 0
;  1467     1589  3    THEN
;  1468     1590  4        BEGIN
;  1469     1591  4        MODU_SCOPE[SCOPE$L_FLINK] = NORM_SCOPE;
;  1470     1592  4        SCOPEPTR = NORM_SCOPE;
;  1471     1593  3        END;
;  1472     1594  3
;  1473     1595  3        IF .MODU_SCOPE[SCOPE$L_RSTPTR] NEQ 0 THEN SCOPEPTR = MODU_SCOPE;
;  1474     1596  2        END;
;  1475     1597  2
;  1476     1598  2
;  1477     1599  2    ! Set up NEXTSETMOD for a search through all SET modules.  Also save the
;  1478     1600  2    ! scope-list start pointer so we can look up the symbol in that scope in
;  1479     1601  2    ! case it happens to be register name.
;  1480     1602  2    !
;  1481     1603  2    NEXTSETMOD = .RST$START_ADDR;
;  1482     1604  2    REG_SCOPE = FALSE;
;  1483     1605  2    REG_LINE_LEX_PTR = 0;
;  1484     1606  2    FIRST_MODPTR = 0;
;  1485     1607  2    SCOPE_START_PTR = .SCOPEPTR;
;  1486     1608  3    IF (.SCOPEPTR EQL MODU_SCOPE) AND (.MODU_SCOPE[SCOPE$L_FLINK] NEQ 0)
;  1487     1609  2    THEN
;  1488     1610  2        SCOPE_START_PTR = .MODU_SCOPE[SCOPE$L_FLINK];
;  1489     1611  2
;  1490     1612  2
;  1491     1613  2    ! Loop through all the proper scopes, searching for a symbol which matches
;  1492     1614  2    ! the specified pathname.
```

```
;  1493          1615  2      !
;  1494          1616  2      WHILE TRUE DO
;  1495          1617  3          BEGIN
;  1496          1618  3
;  1497          1619  3
;  1498          1620  3          ! Loop through the scope selection code until we find a scope in which
;  1499          1621  3          ! to search for the specified pathname.
;  1500          1622  3          !
;  1501          1623  3          HAVE_SCOPE = FALSE;
;  1502          1624  3          WHILE TRUE DO
;  1503          1625  4              BEGIN
;  1504          1626  4
;  1505          1627  4
;  1506          1628  4              ! If the scope list has no more entries, we have searched all scopes
;  1507          1629  4              ! on the list without finding the desired symbol.  This means that
;  1508          1630  4              ! the symbol is not in the RST so we return RST$K_INVALID as the
;  1509          1631  4              ! status.  However, we first call GET_REGISTER_SYMID to see if the
;  1510          1632  4              ! symbol could be a register name (e.g., "%R5").  If so, we return
;  1511          1633  4              ! the register SYMID built by GET_REGISTER_SYMID instead.
;  1512          1634  4              !
;  1513          1635  4              IF .SCOPEPTR EQL 0
;  1514          1636  4              THEN
;  1515          1637  5                  BEGIN
;  1516          1638  5
;  1517          1639  5
;  1518          1640  5                  ! Determine whether this name could be a register name.
;  1519          1641  5                  !
;  1520          1642  5                  REGISTER_SYMID = GET_REGISTER_SYMID(.PATHNAME,
;  1521          1643  5                                                     .SCOPE_START_PTR, .REG_LINE_LEX_PTR);
;  1522          1644  5
;  1523          1645  5
;  1524          1646  5                  ! If this is not a register name, return the invalid symbol
;  1525          1647  5                  ! status to the caller.  Note that we also give the informa-
;  1526          1648  5                  ! tional "no line nn" message here if a line number was speci-
;  1527          1649  5                  ! fied which could not be found in the first scope.
;  1528          1650  5                  !
;  1529          1651  5                  IF .REGISTER_SYMID EQL 0
;  1530          1652  5                  THEN
;  1531          1653  6                      BEGIN
;  1532          1654  7                      IF .HAVE_LINE_NUM AND (.FIRST_MODPTR NEQ 0)
;  1533          1655  6                      THEN
;  1534          1656  6                          DBG$LINE_TO_PC_LOOKUP(.LINE_NUM, .STMT_NUM,
;  1535          1657  6                                  .FIRST_MODPTR, LINESTART, LINEEND, TRUE);
;  1536          1658  6
;  1537          1659  6                      SYMID[0] = 0;
;  1538          1660  6                      KIND[0] = RST$K_INVALID;
;  1539          1661  6                      RETURN;
;  1540          1662  5                      END;
;  1541          1663  5
;  1542          1664  5
;  1543          1665  5                  ! This symbol is a register.  Return its SYMID and kind to the
;  1544          1666  5                  ! caller.
;  1545          1667  5                  !
;  1546          1668  5                  SYMID[0] = .REGISTER_SYMID;
;  1547          1669  5                  KIND[0] = .REGISTER_SYMID[RST$B_KIND];
;  1548          1670  5
;  1549          1671  5
```

```
;  1550          1672  5                ! Zero the output parameters saying what scope we found the
;  1551          1673  5                ! symbol in - these are meaningless for registers.
;  1552          1674  5                !
;  1553          1675  5                IF .OUT_SCOPE_STATE NEQ 0
;  1554          1676  5                THEN
;  1555          1677  5                    .OUT_SCOPE_STATE = 0;
;  1556          1678  5                IF .OUT_SCOPE NEQ 0
;  1557          1679  5                THEN
;  1558          1680  5                    .OUT_SCOPE = 0;
;  1559          1681  5
;  1560          1682  5
;  1561          1683  5                ! Mark the register RST entry as being referenced by adding its
;  1562          1684  5                ! address to the RST Reference List (RST$REF_LIST).  This says
;  1563          1685  5                ! that the RST entry is referenced by the current Debug command.
;  1564          1686  5                ! Then return.
;  1565          1687  5                !
;  1566          1688  5                IF .RST$REF_LIST[1] EQL .RST$REF_LIST[0]
;  1567          1689  5                THEN
;  1568          1690  6                    BEGIN
;  1569          1691  6                    RST$REF_LIST[0] = .RST$REF_LIST[0] + 20;
;  1570          1692  6                    NEWREFLIST = DBG$GET_MEMORY(.RST$REF_LIST[0] + 2);
;  1571          1693  6                    CH$MOVE(4*(.RST$REF_LIST[1] + 2), .RST$REF_LIST, .NEWREFLIST);
;  1572          1694  6                    DBG$REL_MEMORY(.RST$REF_LIST);
;  1573          1695  6                    RST$REF_LIST = .NEWREFLIST;
;  1574          1696  5                    END;
;  1575          1697  5
;  1576          1698  5                RST$REF_LIST[1] = .RST$REF_LIST[1] + 1;
;  1577          1699  5                RST$REF_LIST[.RST$REF_LIST[1] + 1] = .RSTPTR;
;  1578          1700  5                RETURN;
;  1579          1701  4                END;
;  1580          1702  4
;  1581          1703  4
;  1582          1704  4            ! Set REG_SCOPE to TRUE if the current scope is the scope in which
;  1583          1705  4            ! a register would be looked up.
;  1584          1706  4            !
;  1585          1707  4            REG_SCOPE = .SCOPEPTR EQL .SCOPE_START_PTR;
;  1586          1708  4
;  1587          1709  4
;  1588          1710  4            ! Try to select a scope to search based on the current scope state.
;  1589          1711  4            !
;  1590          1712  4            SCOPE_STATE = .SCOPEPTR[SCOPE$L_STATE];
;  1591          1713  4            CASE .SCOPE_STATE FROM SCOPE$K_NORMAL TO SCOPE$K_SETMODS OF
;  1592          1714  4                SET
;  1593          1715  4
;  1594          1716  4
;  1595          1717  4                ! Search a normal, named scope as declared with a SET SCOPE
;  1596          1718  4                ! command.  We pick up the scope information directly from the
;  1597          1719  4                ! scope list entry.  Note that the scope's module must be SET;
;  1598          1720  4                ! otherwise the scope is not searched.
;  1599          1721  4                !
;  1600          1722  4                [SCOPE$K_NORMAL]:
;  1601          1723  5                    BEGIN
;  1602          1724  5                    SCOPE = .SCOPEPTR[SCOPE$L_RSTPTR];
;  1603          1725  5                    MODRSTPTR = .SCOPEPTR[SCOPE$L_MODPTR];
;  1604          1726  5                    IF .MODRSTPTR[RST$V_MODSET] THEN HAVE_SCOPE = TRUE;
;  1605          1727  5                    SCOPEPTR = .SCOPEPTR[SCOPE$L_FLINK];
;  1606          1728  4                    END;
```

```
;  1607          1729  4
;  1608          1730  4
;  1609          1731  4                    ! Search a "numbered scope", i.e. the scope where the PC is cur-
;  1610          1732  4                    ! rently positioned N levels down in the CALL stack.  To do this
;  1611          1733  4                    ! we look up the PC in the Static Address Table to find the con-
;  1612          1734  4                    ! taining lexical entity.  If that succeeds (and the module is
;  1613          1735  4                    ! SET), we use that scope.
;  1614          1736  4                    !
;  1615          1737  4                    [SCOPE$K_NUMBERED]:
;  1616          1738  5                        BEGIN
;  1617          1739  5                        DBG$STA_NUMBERED_SCOPE(.SCOPEPTR[SCOPE$L_MODPTR],
;  1618          1740  5                                               MODRSTPTR, SCOPE, NUMSCP_INVOC_NUM);
;  1619          1741  5                        IF .SCOPE NEQ 0 THEN HAVE_SCOPE = TRUE;
;  1620          1742  5                        SCOPEPTR = .SCOPEPTR[SCOPE$L_FLINK];
;  1621          1743  4                        END;
;  1622          1744  4
;  1623          1745  4
;  1624          1746  4                    ! Search the Global Symbol Table (GST) for the symbol.  We do
;  1625          1747  4                    ! this only if the symbol is of the form "X" or "\X".  We do
;  1626          1748  4                    ! the search right here, and if we find the symbol, we return
;  1627          1749  4                    ! to the caller right away with the proper SYMID and KIND.
;  1628          1750  4                    !
;  1629          1751  4                    [SCOPE$K_GLOBAL]:
;  1630          1752  5                        BEGIN
;  1631          1753  5                        PNAME = .PATHVEC[0];
;  1632          1754  5                        IF (.PATHNAME[PTH$B_TOTCNT] EQL .PATHNAME[PTH$B_PATHCNT])AND
;  1633          1755  6                           ((.PATHNAME[PTH$B_TOTCNT] EQL 2 AND .PNAME[0] EQL 0) OR
;  1634          1756  6                            (.PATHNAME[PTH$B_TOTCNT] EQL 1))
;  1635          1757  5                        THEN
;  1636          1758  6                            BEGIN
;  1637          1759  6                            RSTPTR = DBG$STA_LOOKUP_GBL(
;  1638          1760  6                                                        .PATHVEC[.PATHNAME[PTH$B_TOTCNT] - 1]);
;  1639          1761  6                            IF .RSTPTR NEQ 0
;  1640          1762  6                            THEN
;  1641          1763  7                                BEGIN
;  1642          1764  7                                SYMID[0] = .RSTPTR;
;  1643          1765  7                                KIND[0] = .RSTPTR[RST$B_KIND];
;  1644          1766  7
;  1645          1767  7                                ! If the user requested the information then fill in the
;  1646          1768  7                                ! output parameters which say what scope we are looking in.
;  1647          1769  7                                !
;  1648          1770  7                                IF .OUT_SCOPE_STATE NEQ 0
;  1649          1771  7                                THEN
;  1650          1772  7                                    .OUT_SCOPE_STATE = SCOPE$K_GLOBAL;
;  1651          1773  7                                IF .OUT_SCOPE NEQ 0
;  1652          1774  7                                THEN
;  1653          1775  7                                    .OUT_SCOPE = 0;
;  1654          1776  7
;  1655          1777  7                                RETURN;
;  1656          1778  6                                END;
;  1657          1779  6
;  1658          1780  5                        END;
;  1659          1781  5
;  1660          1782  5                    SCOPEPTR = .SCOPEPTR[SCOPE$L_FLINK];
;  1661          1783  4                    END;
;  1662          1784  4
;  1663          1785  4
```

```
;  1664          1786  4          ! Search all SET modules for the symbol.  Here we locate the
;  1665          1787  4          ! next SET module and use that as the current scope.  Note that
;  1666          1788  4          ! we accumulate candidate symbols over all SET modules before
;  1667          1789  4          ! selecting the candidate that best matches the name.
;  1668          1790  4          !
;  1669          1791  4          [SCOPE$K_SETMODS]:
;  1670          1792  5              BEGIN
;  1671          1793  5
;  1672          1794  5
;  1673          1795  5              ! The first time through, make NEXTSETMOD point to the first
;  1674          1796  5              ! SET module and set the number of candidates to zero.
;  1675          1797  5              !
;  1676          1798  5              IF .NEXTSETMOD EQL .RST$START_ADDR
;  1677          1799  5              THEN
;  1678          1800  6                  BEGIN
;  1679          1801  6                  WHILE .NEXTSETMOD NEQ 0 DO
;  1680          1802  7                      BEGIN
;  1681          1803  7                      IF .NEXTSETMOD[RST$V_MODSET] THEN EXITLOOP;
;  1682          1804  7                      NEXTSETMOD = .NEXTSETMOD[RST$L_NXTMODPTR];
;  1683          1805  6                      END;
;  1684          1806  6
;  1685          1807  5                  END;
;  1686          1808  5
;  1687          1809  5
;  1688          1810  5              ! Make MODRSTPTR and SCOPE point to the next SET module and
;  1689          1811  5              ! make NEXTSETMOD point to the SET module we will search the
;  1690          1812  5              ! next time around.  When NEXTSETMOD becomes zero, there is
;  1691          1813  5              ! no next time around.
;  1692          1814  5              !
;  1693          1815  5              MODRSTPTR = .NEXTSETMOD;
;  1694          1816  5              SCOPE = .MODRSTPTR;
;  1695          1817  5              WHILE .NEXTSETMOD NEQ 0 DO
;  1696          1818  6                  BEGIN
;  1697          1819  6                  NEXTSETMOD = .NEXTSETMOD[RST$L_NXTMODPTR];
;  1698          1820  6                  IF .NEXTSETMOD EQL 0 THEN EXITLOOP;
;  1699          1821  6                  IF .NEXTSETMOD[RST$V_MODSET] THEN EXITLOOP;
;  1700          1822  5                  END;
;  1701          1823  5
;  1702          1824  5              IF .MODRSTPTR NEQ 0 THEN HAVE_SCOPE = TRUE;
;  1703          1825  5              IF .NEXTSETMOD EQL 0 THEN SCOPEPTR = .SCOPEPTR[SCOPE$L_FLINK];
;  1704          1826  4              END;
;  1705          1827  4
;  1706          1828  4          TES;
;  1707          1829  4
;  1708          1830  4
;  1709          1831  4          ! If we now have a scope to search, exit the scope-locating loop
;  1710          1832  4          ! and search that scope.  Otherwise, loop to locate another scope.
;  1711          1833  4          !
;  1712          1834  4          IF .HAVE_SCOPE THEN EXITLOOP;
;  1713          1835  4
;  1714          1836  3          END;                        ! End of WHILE loop to find a scope
;  1715          1837  3
;  1716          1838  3
;  1717          1839  3      ! We now have a scope to search.  Make sure the corresponding module's
;  1718          1840  3      ! symbol table is in the RST.
;  1719          1841  3      !
;  1720          1842  3      IF NOT .MODRSTPTR[RST$V_MOD_IN_RST]
```

```
;  1721     1843  3          THEN
;  1722     1844  3              DBG$RST_BUILD(.MODRSTPTR, FALSE);
;  1723     1845  3
;  1724     1846  3
;  1725     1847  3          ! If the user requested the information then fill in the
;  1726     1848  3          ! output parameters which say what scope we are looking in.
;  1727     1849  3          !
;  1728     1850  3          IF .OUT_SCOPE_STATE NEQ 0
;  1729     1851  3          THEN
;  1730     1852  3              .OUT_SCOPE_STATE = .SCOPE_STATE;
;  1731     1853  3          IF .OUT_SCOPE NEQ 0
;  1732     1854  3          THEN
;  1733     1855  3              .OUT_SCOPE = .SCOPE;
;  1734     1856  3
;  1735     1857  3
;  1736     1858  3          ! If there is a line number in the pathname, find the lexical entity
;  1737     1859  3          ! within this scope's module which contains that line number.  Note
;  1738     1860  3          ! that we search for the lowest level (innermost) lexical entity.
;  1739     1861  3          !
;  1740     1862  3          IF .HAVE_LINE_NUM
;  1741     1863  3          THEN
;  1742     1864  4              BEGIN
;  1743     1865  4
;  1744     1866  4
;  1745     1867  4              ! If this is the first real scope on the scope list, save the
;  1746     1868  4              ! current Module RST Entry pointer in case we will need it for
;  1747     1869  4              ! the "no line nnn" informational message.
;  1748     1870  4              !
;  1749     1871  4              IF .FIRST_MODPTR EQL 0 THEN FIRST_MODPTR = .MODRSTPTR;
;  1750     1872  4
;  1751     1873  4
;  1752     1874  4              ! Look up the line and statement numbers in the scope's module.
;  1753     1875  4              !
;  1754     1876  4              STATUS = DBG$LINE_TO_PC_LOOKUP(.LINE_NUM, .STMT_NUM,
;  1755     1877  4                                             .MODRSTPTR, LINESTART, LINEEND, FALSE);
;  1756     1878  4
;  1757     1879  4
;  1758     1880  4              ! Look up the lowest-level (innermost) lexical entity which contains
;  1759     1881  4              ! the line we just looked up.  We do this by searching the module's
;  1760     1882  4              ! Static Address Table.
;  1761     1883  4              !
;  1762     1884  4              SATPTR = .MODRSTPTR[RST$L_SAT_PTR];
;  1763     1885  4              IF NOT .STATUS THEN SATPTR = 0;
;  1764     1886  4              LINE_LEX_PTR = 0;
;  1765     1887  4              WHILE .SATPTR NEQ 0 DO
;  1766     1888  5                  BEGIN
;  1767     1889  5                  IF .SATPTR[SAT$L_START] GTR .LINESTART THEN EXITLOOP;
;  1768     1890  5                  RSTPTR = .SATPTR[SAT$L_RSTPTR];
;  1769     1891  5                  IF (.SATPTR[SAT$L_END] GEQ .LINESTART) AND
;  1770     1892  6                     (.RSTPTR[RST$B_KIND] EQL RST$K_ROUTINE OR
;  1771     1893  6                      .RSTPTR[RST$B_KIND] EQL RST$K_BLOCK)
;  1772     1894  5                  THEN
;  1773     1895  6                      BEGIN
;  1774     1896  6                      IF .LINE_LEX_PTR EQL 0
;  1775     1897  6                      THEN
;  1776     1898  6                          LINE_LEX_PTR = .RSTPTR
;  1777     1899  6
```

```
;  1778          1900  6                    ELSE
;  1779          1901  7                        BEGIN
;  1780          1902  7                        RPTR = .RSTPTR;
;  1781          1903  7                        WHILE .RPTR[RST$B_KIND] NEQ RST$K_MODULE DO
;  1782          1904  8                            BEGIN
;  1783          1905  8                            IF .RPTR EQL .LINE_LEX_PTR
;  1784          1906  8                            THEN
;  1785          1907  9                                BEGIN
;  1786          1908  9                                LINE_LEX_PTR = .RSTPTR;
;  1787          1909  9                                EXITLOOP;
;  1788          1910  8                                END;
;  1789          1911  8
;  1790          1912  8                            RPTR = .RPTR[RST$L_UPSCOPEPTR];
;  1791          1913  7                            END;
;  1792          1914  7
;  1793          1915  6                        END;
;  1794          1916  6
;  1795          1917  5                    END;
;  1796          1918  5
;  1797          1919  5                SATPTR = .SATPTR[SAT$L_FLINK];
;  1798          1920  5
;  1799          1921  4                END;                    ! End of WHILE loop over the SAT
;  1800          1922  4
;  1801          1923  4
;  1802          1924  4            ! In case we have to look up a register in this scope, save the
;  1803          1925  4            ! value of the line number lexical entity pointer.
;  1804          1926  4            !
;  1805          1927  4            IF .REG_SCOPE THEN REG_LINE_LEX_PTR = .LINE_LEX_PTR;
;  1806          1928  4
;  1807          1929  3            END;                    ! End of line number lexical entity code
;  1808          1930  3
;  1809          1931  3
;  1810          1932  3        ! Set up the RST Hash Table search for this symbol and loop over all
;  1811          1933  3        ! hash table entries for the symbol's name.  For each RST entry we find,
;  1812          1934  3        ! we try to match the full pathname.  If this succeeds and the symbol is
;  1813          1935  3        ! in the current scope, the RST entry is added to a "candidate list".
;  1814          1936  3        !
;  1815          1937  3        DBG$HASH_FIND_SETUP(.NAMEPTR);
;  1816          1938  3        WHILE TRUE DO
;  1817          1939  4            BEGIN
;  1818          1940  4
;  1819          1941  4
;  1820          1942  4            ! Get the next RST entry with the specified symbol name.  If the
;  1821          1943  4            ! desired symbol is a line number, we pick up the lexical entity
;  1822          1944  4            ! which contains the line instead.
;  1823          1945  4            !
;  1824          1946  4            IF .LINE_NUM_IS_LAST
;  1825          1947  4            THEN
;  1826          1948  5                BEGIN
;  1827          1949  5                RSTPTR = .LINE_LEX_PTR;
;  1828          1950  5                LINE_LEX_PTR = 0;
;  1829          1951  5                END
;  1830          1952  5
;  1831          1953  5
;  1832          1954  5            ! Otherwise, pick up the next RST Hash Table entry with the
;  1833          1955  5            ! specified symbol name.
;  1834          1956  5            !
```

```
;  1835          1957  4              ELSE
;  1836          1958  4                  RSTPTR = DBG$HASH_FIND(.NAMEPTR);
;  1837          1959  4
;  1838          1960  4
;  1839          1961  4              ! If the RST pointer is zero, we found no more symbols with the
;  1840          1962  4              ! right name so we exit the search loop for this scope.
;  1841          1963  4              !
;  1842          1964  4              IF .RSTPTR EQL 0 THEN EXITLOOP;
;  1843          1965  4
;  1844          1966  4
;  1845          1967  4              ! Loop through the RST entry's scope chain to match it to the speci-
;  1846          1968  4              ! fied pathname.  If the full pathname matches and the symbol is in
;  1847          1969  4              ! the current scope, we add the RST entry to the "candidate list".
;  1848          1970  4              !
;  1849          1971  4              STKPTR = 0;
;  1850          1972  4              RPTR = .RSTPTR;
;  1851          1973  4              PINDEX = .PATHNAME[PTH$B_TOTCNT];
;  1852          1974  4              WHILE TRUE DO
;  1853          1975  5                  BEGIN
;  1854          1976  5
;  1855          1977  5
;  1856          1978  5                  ! If this is a global symbol or a module, do not even attempt to
;  1857          1979  5                  ! match it to the pathname--exit the pathname matching loop now.
;  1858          1980  5                  !
;  1859          1981  5                  IF  .RSTPTR[RST$V_GLOBAL] OR
;  1860          1982  5                     (.RSTPTR[RST$B_KIND] EQL RST$K_MODULE) OR
;  1861          1983  6                     ((NOT .TYPE_FLAG) AND (.RSTPTR[RST$B_KIND] EQL RST$K_TYPE))
;  1862          1984  5                  THEN
;  1863          1985  5                      EXITLOOP;
;  1864          1986  5
;  1865          1987  5
;  1866          1988  5                  ! Also, if we are called by DBG$RST_SETSCOPE, do not consider
;  1867          1989  5                  ! the symbol unless it is a routine or lexical block.
;  1868          1990  5                  !
;  1869          1991  5                  IF .SET_SCOPE
;  1870          1992  5                  THEN
;  1871          1993  6                      BEGIN
;  1872          1994  6                      IF (.RSTPTR[RST$B_KIND] NEQ RST$K_ROUTINE) AND
;  1873          1995  7                         (.RSTPTR[RST$B_KIND] NEQ RST$K_BLOCK)
;  1874          1996  6                      THEN
;  1875          1997  6                          EXITLOOP;
;  1876          1998  6
;  1877          1999  5                      END;
;  1878          2000  5
;  1879          2001  5
;  1880          2002  5                  ! Make a new SYMSTACK entry for this RST entry in the up-scope
;  1881          2003  5                  ! chain.
;  1882          2004  5                  !
;  1883          2005  5                  STKPTR = .STKPTR + 1;
;  1884          2006  5                  IF .STKPTR GEQ MAX_STACK THEN EXITLOOP;
;  1885          2007  5                  SYMSTACK[.STKPTR, STK_RSTPTR] = .RPTR;
;  1886          2008  5                  SYMSTACK[.STKPTR, STK_PINDEX] = 0;
;  1887          2009  5                  SYMSTACK[.STKPTR, STK_TPINDEX] = 0;
;  1888          2010  5
;  1889          2011  5
;  1890          2012  5                  ! If this pathname component is a line number or a scope number,
;  1891          2013  5                  ! we skip over it in pathname matching.
```

```
;  1892     2014  5                    !
;  1893     2015  5                    IF (.HAVE_LINE_NUM AND (.PINDEX EQL .LINE_NUM_LOC)) OR
;  1894     2016  6                       (.HAVE_NUM_SCOPE AND (.PINDEX EQL 1))
;  1895     2017  5                    THEN
;  1896     2018  5                        PINDEX = .PINDEX - 1;
;  1897     2019  5
;  1898     2020  5
;  1899     2021  5                    ! If the current pathname component matches the current scope
;  1900     2022  5                    ! chain name, set PINDEX to point to the next pathname compo-
;  1901     2023  5                    ! nent.  If PINDEX already pointed to the top component name,
;  1902     2024  5                    ! the pathname matches and we make a candidate list entry.
;  1903     2025  5                    !
;  1904     2026  5                    PNAME = .PATHVEC[.PINDEX - 1];
;  1905     2027  5                    IF .PINDEX EQL 0 THEN PNAME = .PATHVEC[0];
;  1906     2028  5                    RNAME = DBG$GET_DST_NAME(.RPTR[RST$L_DSTPTR]);
;  1907     2029  5                    IF CH$EQL(.PNAME[0], PNAME[1], .RNAME[0], RNAME[1], 0) OR
;  1908     2030  6                       (.PINDEX EQL 0)
;  1909     2031  5                    THEN
;  1910     2032  6                        BEGIN
;  1911     2033  6
;  1912     2034  6
;  1913     2035  6                        ! Record the fact that RPTR matches this Pathname component.
;  1914     2036  6                        !
;  1915     2037  6                        SYMSTACK[.STKPTR, STK_PINDEX] = .PINDEX;
;  1916     2038  6
;  1917     2039  6
;  1918     2040  6                        ! If the last (top-level) pathname component just matched,
;  1919     2041  6                        ! we see if the symbol is in the current scope.  If it is,
;  1920     2042  6                        ! we add the symbol to the candidate list (CANDLST).
;  1921     2043  6                        !
;  1922     2044  6                        IF (.PINDEX LEQ .PATHNAME[PTH$B_PATHCNT]) AND
;  1923     2045  7                           (.RPTR[RST$B_KIND] NEQ RST$K_TYPCOMP)
;  1924     2046  6                        THEN
;  1925     2047  7                            BEGIN
;  1926     2048  7
;  1927     2049  7
;  1928     2050  7                            ! Determine what the scope of the current symbol is.
;  1929     2051  7                            !
;  1930     2052  7                            SYMSCOPE = .RSTPTR;
;  1931     2053  7                            IF .RSTPTR[RST$B_KIND] NEQ RST$K_MODULE
;  1932     2054  7                            THEN
;  1933     2055  7                                SYMSCOPE = .RSTPTR[RST$L_UPSCOPEPTR];
;  1934     2056  7
;  1935     2057  7                            IF .SYMSCOPE[RST$B_KIND] EQL RST$K_TYPE
;  1936     2058  7                            THEN
;  1937     2059  7                                SYMSCOPE = .SYMSCOPE[RST$L_UPSCOPEPTR];
;  1938     2060  7
;  1939     2061  7
;  1940     2062  7                            ! If we are searching all set modules, we claim that the
;  1941     2063  7                            ! the symbol is declared at the module level so that all
;  1942     2064  7                            ! symbols have the same definition depth.  Also, if we
;  1943     2065  7                            ! are looking for a line number, we treat it as being
;  1944     2066  7                            ! defined at the module level.
;  1945     2067  7                            !
;  1946     2068  7                            IF .SCOPE_STATE EQL SCOPE$K_SETMODS OR .LINE_NUM_IS_LAST
;  1947     2069  7                            THEN
;  1948     2070  8                                BEGIN
```

```
;  1949     2071  8                    WHILE .SYMSCOPE[RST$B_KIND] NEQ RST$K_MODULE DO
;  1950     2072  8                        SYMSCOPE = .SYMSCOPE[RST$L_UPSCOPEPTR];
;  1951     2073  8
;  1952     2074  7                    END;
;  1953     2075  7
;  1954     2076  7
;  1955     2077  7                ! Determine whether the symbol is in the current scope.
;  1956     2078  7                !
;  1957     2079  7                SCPTR = .SCOPE;
;  1958     2080  7                DEFDEPTH = 0;
;  1959     2081  7                IN_SCOPE = TRUE;
;  1960     2082  7                WHILE TRUE DO
;  1961     2083  8                    BEGIN
;  1962     2084  8                    IF .SCPTR EQL .SYMSCOPE THEN EXITLOOP;
;  1963     2085  8                    IF .SCPTR[RST$B_KIND] EQL RST$K_MODULE
;  1964     2086  8                    THEN
;  1965     2087  9                        BEGIN
;  1966     2088  9                        IN_SCOPE = FALSE;
;  1967     2089  9                        EXITLOOP;
;  1968     2090  8                        END;
;  1969     2091  8
;  1970     2092  8                    SCPTR = .SCPTR[RST$L_UPSCOPEPTR];
;  1971     2093  8                    DEFDEPTH = .DEFDEPTH + 1;
;  1972     2094  7                    END;
;  1973     2095  7
;  1974     2096  7
;  1975     2097  7                ! If a line number is present in the pathname, make sure
;  1976     2098  7                ! this symbol has the line's lexical entity in its up-
;  1977     2099  7                ! scope chain.  Otherwise set IN_SCOPE to FALSE.
;  1978     2100  7                !
;  1979     2101  7                IF .HAVE_LINE_NUM AND .IN_SCOPE AND NOT .LINE_NUM_IS_LAST
;  1980     2102  7                THEN
;  1981     2103  8                    BEGIN
;  1982     2104  8                    IN_SCOPE = FALSE;
;  1983     2105  8                    SCPTR = .RSTPTR;
;  1984     2106  8                    WHILE .SCPTR[RST$B_KIND] NEQ RST$K_MODULE DO
;  1985     2107  9                        BEGIN
;  1986     2108  9                        IF .SCPTR EQL .LINE_LEX_PTR
;  1987     2109  9                        THEN
;  1988     2110 10                            BEGIN
;  1989     2111 10                            IN_SCOPE = TRUE;
;  1990     2112 10                            EXITLOOP;
;  1991     2113  9                            END;
;  1992     2114  9
;  1993     2115  9                        SCPTR = .SCPTR[RST$L_UPSCOPEPTR];
;  1994     2116  8                        END;
;  1995     2117  8
;  1996     2118  7                    END;
;  1997     2119  7
;  1998     2120  7
;  1999     2121  7                ! If the symbol is in the current scope, create a "can-
;  2000     2122  7                ! didate entry" for it.  Then enter that entry on the
;  2001     2123  7                ! "candidate list".
;  2002     2124  7                !
;  2003     2125  7                IF .IN_SCOPE
;  2004     2126  7                THEN
;  2005     2127  8                    BEGIN
```

```
;  2006          2128  8
;  2007          2129  8
;  2008          2130  8                    ! Create the candidate entry for the symbol.
;  2009          2131  8                    !
;  2010          2132  8                    CANDBLK = DBG$GET_MEMORY(CAND_ENTSIZ*(.STKPTR+1));
;  2011          2133  8                    J = 0;
;  2012          2134  8                    INCR I FROM 1 TO .STKPTR DO
;  2013          2135  9                        BEGIN
;  2014          2136  9                        IF .SYMSTACK[.I, STK_TPINDEX] EQL 0
;  2015          2137  9                        THEN
;  2016          2138 10                            BEGIN
;  2017          2139 10                            CANDBLK[.J, CAND_RSTPTR] = .SYMSTACK[.I, STK_RSTPTR];
;  2018          2140 10                            CANDBLK[.J, CAND_PINDEX] = .SYMSTACK[.I, STK_PINDEX];
;  2019          2141 10                            J = .J + 1;
;  2020          2142  9                            END;
;  2021          2143  9
;  2022          2144  8                        END;
;  2023          2145  8
;  2024          2146  8                    CANDBLK[.J, CAND_RSTPTR] = 0;
;  2025          2147  8                    CANDBLK[.J, CAND_PINDEX] = .DEFDEPTH;
;  2026          2148  8
;  2027          2149  8
;  2028          2150  8                    ! Enter the candidate entry on the candidate list.
;  2029          2151  8                    ! Note that we expand the candidate list memory
;  2030          2152  8                    ! block if it is too small.
;  2031          2153  8                    !
;  2032          2154  8                    NCANDS = .NCANDS + 1;
;  2033          2155  8                    IF .NCANDS GTR .CANDLST[0]
;  2034          2156  8                    THEN
;  2035          2157  9                        BEGIN
;  2036          2158  9                        CANDLST[0] = .CANDLST[0] + 10;
;  2037          2159  9                        OLDCAND = .CANDLST;
;  2038          2160  9                        CANDLST = DBG$GET_MEMORY(.CANDLST[0] + 1);
;  2039          2161  9                        CH$MOVE(4*.NCANDS, .OLDCAND, .CANDLST);
;  2040          2162  9                        DBG$REL_MEMORY(.OLDCAND);
;  2041          2163  8                        END;
;  2042          2164  8
;  2043          2165  8                    CANDLST[.NCANDS] = .CANDBLK;
;  2044          2166  7                    END;
;  2045          2167  7
;  2046          2168  7
;  2047          2169  7                ! Now tear down SYMSTACK until we get to the bottom or
;  2048          2170  7                ! until we get to a TYPE entry whose type reference
;  2049          2171  7                ! table has not been exhausted.  If no such entry is
;  2050          2172  7                ! found, we exit the pathname match loop (with STKPTR =
;  2051          2173  7                ! 0) for this hash table symbol.
;  2052          2174  7                !
;  2053          2175  7                WHILE .STKPTR GTR 0 DO
;  2054          2176  8                    BEGIN
;  2055          2177  8                    IF .SYMSTACK[.STKPTR, STK_TPINDEX] NEQ 0
;  2056          2178  8                    THEN
;  2057          2179  9                        BEGIN
;  2058          2180  9                        TPINDEX = .SYMSTACK[.STKPTR, STK_TPINDEX];
;  2059          2181  9                        RPTR = .SYMSTACK[.STKPTR, STK_RSTPTR];
;  2060          2182  9                        IF .TPINDEX LSS .RPTR[RST$W_TYPREFCNT] THEN EXITLOOP;
;  2061          2183  8                        END;
;  2062          2184  8
```

```
;  2063          2185  8                    STKPTR = .STKPTR - 1;
;  2064          2186  7                    END;
;  2065          2187  7
;  2066          2188  7                IF .STKPTR EQL 0 THEN EXITLOOP;
;  2067          2189  7
;  2068          2190  7
;  2069          2191  7                ! If we found a type entry in SYMSTACK whose reference
;  2070          2192  7                ! table is not exhausted, we reset RPTR and PINDEX to
;  2071          2193  7                ! continue generating possible candidates from symbols
;  2072          2194  7                ! of this type.
;  2073          2195  7                !
;  2074          2196  7                SYMSTACK[.STKPTR, STK_TPINDEX] = .TPINDEX + 1;
;  2075          2197  7                TPTR = .RPTR[RST$L_TYPREFTBL];
;  2076          2198  7                RPTR = .TPTR[.TPINDEX];
;  2077          2199  7                PINDEX = .SYMSTACK[.STKPTR, STK_PINDEX] + 1;
;  2078          2200  7
;  2079          2201  6                END;            ! End of .PINDEX LEQ ... THEN clause
;  2080          2202  6
;  2081          2203  6
;  2082          2204  6             ! We have more pathname components to match.  Decrement
;  2083          2205  6             ! PINDEX and stay in the pathname matching loop.
;  2084          2206  6             !
;  2085          2207  6             PINDEX = .PINDEX - 1;
;  2086          2208  6             IF .PINDEX LSS 0 THEN PINDEX = 0;
;  2087          2209  6
;  2088          2210  5             END;               ! End of CH$EQL test's THEN clause
;  2089          2211  5
;  2090          2212  5
;  2091          2213  5          ! If the RST entry's up-scope chain has ended, we exit the path-
;  2092          2214  5          ! name matching loop.  Otherwise, we link up the up-scope chain
;  2093          2215  5          ! and continue pathname matching.
;  2094          2216  5          !
;  2095          2217  5          IF .RPTR[RST$B_KIND] EQL RST$K_MODULE THEN EXITLOOP;
;  2096          2218  5          RPTR = .RPTR[RST$L_UPSCOPEPTR];
;  2097          2219  5
;  2098          2220  5
;  2099          2221  5          ! If the up-scope symbol is a Type RST Entry, we set up an entry
;  2100          2222  5          ! for it on SYMSTACK.  This stack entry will enable us to try
;  2101          2223  5          ! all possible symbols of this type as the up-scope continuation
;  2102          2224  5          ! of a type component (e.g., record or variant component).
;  2103          2225  5          !
;  2104          2226  5          IF .RPTR[RST$B_KIND] EQL RST$K_TYPE
;  2105          2227  5          THEN
;  2106          2228  6              BEGIN
;  2107          2229  6              IF .RPTR[RST$L_TYPREFTBL] EQL 0 THEN EXITLOOP;
;  2108          2230  6              STKPTR = .STKPTR + 1;
;  2109          2231  6              IF .STKPTR GEQ MAX_STACK THEN EXITLOOP;
;  2110          2232  6              SYMSTACK[.STKPTR, STK_RSTPTR] = .RPTR;
;  2111          2233  6              SYMSTACK[.STKPTR, STK_PINDEX] = .PINDEX;
;  2112          2234  6              SYMSTACK[.STKPTR, STK_TPINDEX] = 1;
;  2113          2235  6              TPTR = .RPTR[RST$L_TYPREFTBL];
;  2114          2236  6              RPTR = .TPTR[0];
;  2115          2237  5              END;
;  2116          2238  5
;  2117          2239  4          END;                   ! End of pathname matching WHILE loop
;  2118          2240  4
;  2119          2241  3      END;                       ! End of WHILE loop over hash table
```

```
;  2120          2242  3
;  2121          2243
;  2122          2244              ! We now have a list of candidate symbols which are in the current scope
;  2123          2245              ! and which may match the pathname.  Unless the list is empty, call a
;  2124          2246              ! language-specific routine to select the candidate symbol which best
;  2125          2247              ! matches the pathname.  Note that when we search all SET modules, we
;  2126          2248              ! do not call this selection routine until candidate symbols have been
;  2127          2249              ! accumulated from all SET modules.
;  2128          2250              !
;  2129          2251  3           IF (.NCANDS GTR 0) AND
;  2130          2252  4              (.SCOPE_STATE NEQ SCOPE$K_SETMODS OR .NEXTSETMOD EQL 0)
;  2131          2253  3           THEN
;  2132          2254  4               BEGIN
;  2133          2255  4               CASE .DBG$GB_LANGUAGE FROM DBG$K_MACRO TO DBG$K_UNKNOWN OF
;  2134          2256  4                   SET
;  2135          2257  4
;  2136          2258  4
;  2137          2259  4                       ! Handle languages with "normal" scope rules--data qualification
;  2138          2260  4                       ! must be complete, or it is absent from the language.
;  2139          2261  4                       !
;  2140          2262  4                       [DBG$K_MACRO, DBG$K_FORTRAN,
;  2141          2263  4                        DBG$K_BLISS, DBG$K_BASIC,
;  2142          2264  4                        DBG$K_PASCAL, DBG$K_C,
;  2143          2265  4                        INRANGE, OUTRANGE]:
;  2144          2266  4                           GOOD_CAND = SCOPE_RULE_NORMAL(.PATHNAME, .NCANDS,
;  2145          2267  4                                                         .CANDLST, .ARRAY_FLAG);
;  2146          2268  4
;  2147          2269  4
;  2148          2270  4                       ! Handle COBOL scope rules--data qualification need not be
;  2149          2271  4                       ! complete and is resolved by COBOL scope rules.
;  2150          2272  4                       !
;  2151          2273  4                       [DBG$K_COBOL]:
;  2152          2274  5                           BEGIN
;  2153          2275  5                           SCPTR = 0;
;  2154          2276  5                           IF (.SCOPE_STATE EQL SCOPE$K_NORMAL) OR
;  2155          2277  6                              (.SCOPE_STATE EQL SCOPE$K_NUMBERED)
;  2156          2278  5                           THEN
;  2157          2279  5                               SCPTR = .SCOPE;
;  2158          2280  5
;  2159          2281  5                           GOOD_CAND = SCOPE_RULE_COBOL(.PATHNAME,
;  2160          2282  5                                                        .NCANDS, .CANDLST, .SCPTR);
;  2161          2283  4                           END;
;  2162          2284  4
;  2163          2285  4
;  2164          2286  4                       ! Handle PL/I scope rules--data qualification need not be
;  2165          2287  4                       ! complete and is resolved by PL/I rules.
;  2166          2288  4                       !
;  2167          2289  4                       [DBG$K_PLI]:
;  2168          2290  4                           GOOD_CAND = SCOPE_RULE_PLI(.PATHNAME, .NCANDS, .CANDLST);
;  2169          2291  4
;  2170          2292  4                       TES;
;  2171          2293  4
;  2172          2294  4
;  2173          2295  4               ! If we found a valid and unique match for the pathname in this
;  2174          2296  4               ! scope, make CANDBLK point to that symbol and exit the scope
;  2175          2297  4               ! search loop.
;  2176          2298  4               !
```

```
;  2177          2299  4              IF .GOOD_CAND GTR 0
;  2178          2300  4              THEN
;  2179          2301  5                  BEGIN
;  2180          2302  5                  CANDBLK = .CANDLST[.GOOD_CAND];
;  2181          2303  5                  EXITLOOP;
;  2182          2304  4                  END;
;  2183          2305  4
;  2184          2306  4
;  2185          2307  4              ! We did not find a valid and unique symbol.  Release all candidate
;  2186          2308  4              ! blocks on the candidate list to the free memory pool.
;  2187          2309  4              !
;  2188          2310  4              INCR I FROM 1 TO .NCANDS DO DBG$REL_MEMORY(.CANDLST[.I]);
;  2189          2311  4              NCANDS = 0;
;  2190          2312  4
;  2191          2313  4
;  2192          2314  4              ! If the symbol turns out not be unique, return the not-unique
;  2193          2315  4              ! code to KIND and a zero to SYMID; then return to the caller.
;  2194          2316  4              ! Otherwise, loop to locate another scope to search.
;  2195          2317  4              !
;  2196          2318  4              IF .GOOD_CAND EQL -1
;  2197          2319  4              THEN
;  2198          2320  5                  BEGIN
;  2199          2321  5                  SYMID[0] = 0;
;  2200          2322  5                  KIND[0] = RST$K_NOTUNIQUE;
;  2201          2323  5                  RETURN;
;  2202          2324  4                  END;
;  2203          2325  4
;  2204          2326  3              END;
;  2205          2327  3
;  2206          2328  2          END;                            ! End of WHILE loop over all scopes
;  2207          2329  2
;  2208          2330  2
;  2209          2331  2          ! Now go through the symbol's candidate entry to create new Data RST Entries
;  2210          2332  2          ! from any Type Component RST Entries.  These new RST entries represent this
;  2211          2333  2          ! specific instance of data qualification.  These RST entries are put on the
;  2212          2334  2          ! Temporary RST Entry List.
;  2213          2335  2          !
;  2214          2336  2          J = 0;
;  2215          2337  2          WHILE TRUE DO
;  2216          2338  2              BEGIN
;  2217          2339  2              RPTR = .CANDBLK[.J, CAND_RSTPTR];
;  2218          2340  2              IF .RPTR EQL 0 THEN EXITLOOP;
;  2219          2341  2              IF .RPTR[RST$B_KIND] NEQ RST$K_TYPCOMP THEN EXITLOOP;
;  2220          2342  2              RSTPTR = DBG$GET_MEMORY(RST$K_DATENTSIZ);
;  2221          2343  2              RSTPTR[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  2222          2344  2              RST$TEMP_LIST = .RSTPTR;
;  2223          2345  2              RSTPTR[RST$L_DSTPTR] = .RPTR[RST$L_DSTPTR];
;  2224          2346  2              RSTPTR[RST$L_UPSCOPEPTR] = .RPTR[RST$L_UPSCOPEPTR];
;  2225          2347  2              RSTPTR[RST$B_KIND] = RST$K_INVALID;
;  2226          2348  2              RSTPTR[RST$L_TYPEPTR] = .RPTR[RST$L_TYPEPTR];
;  2227          2349  2              CANDBLK[.J, CAND_RSTPTR] = .RSTPTR;
;  2228          2350  2              J = .J + 1;
;  2229          2351  2              END;
;  2230          2352  2
;  2231          2353  2
;  2232          2354  2          ! Then make a second scan over the new Data RST Entries to fix up their
;  2233          2355  2          ! up-scope pointers.
```

```
;  2234     2356  2      !
;  2235     2357  2      J = 0;
;  2236     2358  2      WHILE TRUE DO
;  2237     2359  2          BEGIN
;  2238     2360  2          RSTPTR = .CANDBLK[.J, CAND_RSTPTR];
;  2239     2361  2          IF .RSTPTR EQL 0 THEN EXITLOOP;
;  2240     2362  2          IF .RSTPTR[RST$B_KIND] NEQ RST$K_INVALID THEN EXITLOOP;
;  2241     2363  2          RSTPTR[RST$B_KIND] = RST$K_DATA;
;  2242     2364  2          IF .CANDBLK[.J + 1, CAND_RSTPTR] NEQ 0
;  2243     2365  2          THEN
;  2244     2366  2              RSTPTR[RST$L_UPSCOPEPTR] = .CANDBLK[.J + 1, CAND_RSTPTR];
;  2245     2367  2
;  2246     2368  2          J = .J + 1;
;  2247     2369  2          END;
;  2248     2370  2
;  2249     2371  2
;  2250     2372  2      ! If the symbol is a line number, create the Line Number RST Entry for the
;  2251     2373  2      ! symbol and make its address the symbol's SYMID.
;  2252     2374  2      !
;  2253     2375  2      IF .LINE_NUM_IS_LAST
;  2254     2376  2      THEN
;  2255     2377  2          BEGIN
;  2256     2378  2          MODRSTPTR = .CANDBLK[0, CAND_RSTPTR];
;  2257     2379  2          WHILE .MODRSTPTR[RST$B_KIND] NEQ RST$K_MODULE DO
;  2258     2380  2              MODRSTPTR = .MODRSTPTR[RST$L_UPSCOPEPTR];
;  2259     2381  2
;  2260     2382  2          STATUS = DBG$LINE_TO_PC_LOOKUP(.LINE_NUM, .STMT_NUM,
;  2261     2383  2                                         .MODRSTPTR, LINESTART, LINEEND, FALSE);
;  2262     2384  2          CANDBLK[0, CAND_RSTPTR] = DBG$STA_LINE_NUM_RST(.CANDBLK[0, CAND_RSTPTR],
;  2263     2385  2                  .LINE_NUM, .STMT_NUM, .LINESTART, .LINEEND);
;  2264     2386  2          END;
;  2265     2387  2
;  2266     2388  2
;  2267     2389  2      ! Pick up the SYMID (RST pointer) of the symbol we found.
;  2268     2390  2      !
;  2269     2391  2      RSTPTR = .CANDBLK[0, CAND_RSTPTR];
;  2270     2392  2
;  2271     2393  2
;  2272     2394  2      ! If there is an invocation number, check that the invocation number was
;  2273     2395  2      ! applied to the inner-most routine in the up-scope chain.  If that looks
;  2274     2396  2      ! good, create an Invocation Number RST Entry for the symbol.
;  2275     2397  2      !
;  2276     2398  3      IF (.PATHNAME[PTH$B_LOCINVOC] NEQ 0) AND (NOT .HAVE_NUM_SCOPE)
;  2277     2399  2      THEN
;  2278     2400  3          BEGIN
;  2279     2401  3
;  2280     2402  3
;  2281     2403  3          ! Find the inner-most routine containing the declaration of this symbol.
;  2282     2404  3          ! This is the routine to which the invocation number must apply.
;  2283     2405  3          !
;  2284     2406  3          ROUTPTR = .RSTPTR;
;  2285     2407  3          WHILE .ROUTPTR[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  2286     2408  4              BEGIN
;  2287     2409  4              IF .ROUTPTR[RST$B_KIND] EQL RST$K_MODULE
;  2288     2410  4              THEN
;  2289     2411  5                  BEGIN
;  2290     2412  5                  DBG$NPATHDESC_TO_CS(.PATHNAME, PATHSTRING);
```

```
;  2291     2413  5                SIGNAL(DBG$_MISINVNUM, 1, .PATHSTRING);
;  2292     2414  4                END;
;  2293     2415  4
;  2294     2416  4            ROUTPTR = .ROUTPTR[RST$L_UPSCOPEPTR];
;  2295     2417  3            END;
;  2296     2418  3
;  2297     2419  3
;  2298     2420  3        ! Now make sure the invocation number was indeed appended to that
;  2299     2421  3        ! routine name in the pathname.
;  2300     2422  3        !
;  2301     2423  3        PNAME = .PATHVEC[.PATHNAME[PTH$B_LOCINVOC] - 1];
;  2302     2424  3        RNAME = DBG$GET_DST_NAME(.ROUTPTR[RST$L_DSTPTR]);
;  2303     2425  3        IF CH$NEQ(.PNAME[0], PNAME[1], .RNAME[0], RNAME[1], 0)
;  2304     2426  3        THEN
;  2305     2427  4            BEGIN
;  2306     2428  4            DBG$NPATHDESC_TO_CS(.PATHNAME, PATHSTRING);
;  2307     2429  4            SIGNAL(DBG$_MISINVNUM, 1, .PATHSTRING);
;  2308     2430  3            END;
;  2309     2431  3
;  2310     2432  3
;  2311     2433  3        ! All looks good.  Create the Invocation Number RST Entry along with a
;  2312     2434  3        ! new copy of the symbol's RST entry if the number is non-zero.
;  2313     2435  3        !
;  2314     2436  3        IF .PATHNAME[PTH$L_INVOCNUM] NEQ 0
;  2315     2437  3        THEN
;  2316     2438  3            RSTPTR = DBG$BUILD_INVOC_RST(.RSTPTR, .PATHNAME[PTH$L_INVOCNUM]);
;  2317     2439  3
;  2318     2440  3        END
;  2319     2441  3
;  2320     2442  3
;  2321     2443  3        ! If this symbol was specified with a numbered scope (i.e. 2\X) and the
;  2322     2444  3        ! invocation number is non-zero, create an Invocation Number RST Entry
;  2323     2445  3        ! for the symbol.
;  2324     2446  3        !
;  2325     2447  3        ELSE IF .HAVE_NUM_SCOPE AND (.NUMSCP_INVOC_NUM NEQ 0)
;  2326     2448  2        THEN
;  2327     2449  2            RSTPTR = DBG$BUILD_INVOC_RST(.RSTPTR, .NUMSCP_INVOC_NUM)
;  2328     2450  2
;  2329     2451  2
;  2330     2452  2        ! And also, if the symbol was a simple symbol without any pathname qualifi-
;  2331     2453  2        ! cation, do the proper up-level addressing (if any) in the scope we found
;  2332     2454  2        ! it in to get the proper invocation number for the symbol.
;  2333     2455  2        !
;  2334     2456  2        ELSE IF (.PATHNAME[PTH$B_LOCINVOC] EQL 0) AND
;  2335     2457  3                (.PATHNAME[PTH$B_PATHCNT] EQL 1)
;  2336     2458  2        THEN
;  2337     2459  2            RSTPTR = FOLLOW_STATIC_LINK(.RSTPTR, .SCOPE);
;  2338     2460  2
;  2339     2461  2
;  2340     2462  2        ! Now return the selected symbol's SYMID and KIND to the caller.
;  2341     2463  2        !
;  2342     2464  2        SYMID[0] = .RSTPTR;
;  2343     2465  2        KIND[0] = .RSTPTR[RST$B_KIND];
;  2344     2466  2
;  2345     2467  2
;  2346     2468  2        ! Release all candidate blocks on the candidate list to the memory pool.
;  2347     2469  2        !
```

```
;  2348          2470  2      INCR I FROM 1 TO .NCANDS DO DBG$REL_MEMORY(.CANDLST[.I]);
;  2349          2471  2
;  2350          2472  2
;  2351          2473  2      ! Mark this symbol's RST entry as being referenced by adding its address
;  2352          2474  2      ! to the RST Reference List (RST$REF_LIST).  This only says that the RST
;  2353          2475  2      ! entry is referenced by the current Debug command.  Note that we expand
;  2354          2476  2      ! the list memory block if it is about to overflow.
;  2355          2477  2      !
;  2356          2478  2      IF .RST$REF_LIST[1] EQL .RST$REF_LIST[0]
;  2357          2479  2      THEN
;  2358          2480  3          BEGIN
;  2359          2481  3          RST$REF_LIST[0] = .RST$REF_LIST[0] + 20;
;  2360          2482  3          NEWREFLIST = DBG$GET_MEMORY(.RST$REF_LIST[0] + 2);
;  2361          2483  3          CH$MOVE(4*(.RST$REF_LIST[1] + 2), .RST$REF_LIST, .NEWREFLIST);
;  2362          2484  3          DBG$REL_MEMORY(.RST$REF_LIST);
;  2363          2485  3          RST$REF_LIST = .NEWREFLIST;
;  2364          2486  2          END;
;  2365          2487  2
;  2366          2488  2      RST$REF_LIST[1] = .RST$REF_LIST[1] + 1;
;  2367          2489  2      RST$REF_LIST[.RST$REF_LIST[1] + 1] = .RSTPTR;
;  2368          2490  2
;  2369          2491  2
;  2370          2492  2      ! Mark the symbol's module as being the Most Recently Referenced module.
;  2371          2493  2      ! Then return.
;  2372          2494  2      !
;  2373          2495  2      IF .MODRSTPTR NEQ .LRUM$MOST_RECENT THEN DBG$RST_MOST_RECENT(.MODRSTPTR);
;  2374          2496  2      RETURN;
;  2375          2497  2
;  2376          2498  1      END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                                        20  45  4E  49  4C  25  00082 P.AAN:   .ASCII  \%LINE \                                  ;
                    00000000  00000000  00000003  00000000  00088 P.AAO:   .LONG   0, 3, 0, 0                                    ;
53  54  45  47  5C  53  53  45  43  43  41  54  53  52  13  00098 P.AAP:   .ASCII  <19>\RSTACCESS\<92>\GETSYMBOL\                  ;
                                        4C  4F  42  4D  59  000A7                                                               ;

                                                                .PSECT  DBG$OWN,NOEXE,  PIC,2

                                                        0001A           .BLKB   2
                                                00000000  0001C CANDLST:.LONG   0                                              ;
                    00000000  00000000  00000001  00000000  00020 MODU_SCOPE:
                                                                .LONG   0, 1, 0, 0                                              ;
                    00000000  00000000  00000001  00000000  00030 NORM_SCOPE:
                                                                .LONG   0, 1, 0, 0                                              ;
                    00000000  00000000  00000002  00000000  00040 NUMB_SCOPE:
                                                                .LONG   0, 2, 0, 0                                              ;


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                    0FFC 00000          .ENTRY  DBG$STA_GETSYMBOL, Save R2,R3,R4,R5,R6,R7,-     ; 1159
                                                                        R8,R9,R10,R11                                           ;
                                        5E      FC40    CE  9E 00002        MOVAB   -960(SP), SP                                ;
```

```
                    1C  AE 00000000G   00  D0 00007          MOVL    RST$SET_SCOPE, SET_SCOPE                ; 1344
                       00000000G   00  D4 0000F           CLRL    RST$SET_SCOPE                           ; 1345
                57      04  AC          08  C1 00015          ADDL3   #8, PATHNAME, PATHVEC                   ; 1351
                        56      04  BC  9A 0001A          MOVZBL  @PATHNAME, R6                           ; 1352
                    18  AE      FC A746 D0 0001E          MOVL    -4(PATHVEC)[R6], NAMEPTR                ;
                        10  AE      7C 00024          CLRQ    LINE_NUM_IS_LAST                        ; 1359
                        0C  AE      D4 00027          CLRL    LINE_NUM_LOC                            ; 1360
                        58          01  D0 0002A          MOVL    #1, VALID_LINE_FLAG                     ; 1361
                                    55  D4 0002D          CLRL    I                                       ; 1362
                                00B8    31 0002F 1$:      BRW     12$                                     ;
                    08  AE      FC A745 D0 00032 2$:      MOVL    -4(PATHVEC)[I], PNAME                   ; 1364
                        59      08  BE  9A 00038          MOVZBL  @PNAME, R9                              ; 1365
                        06          59  91 0003C          CMPB    R9, #6                                  ;
                                    EE  1B 0003F          BLEQU   1$                                      ;
                5A      08  AE          01  C1 00041          ADDL3   #1, PNAME, R10                          ; 1366
00000000'       EF              6A          06  29 00046          CMPC3   #6, (R10), P.AAN                        ;
                                    DF  12 0004E          BNEQ    1$                                      ;
                50      08  AE          07  C1 00050          ADDL3   #7, PNAME, R0                           ; 1369
                        30          60  91 00055          CMPB    (R0), #48                               ;
                                    0A  1F 00058          BLSSU   3$                                      ;
                50      08  AE          07  C1 0005A          ADDL3   #7, PNAME, R0                           ;
                        39          60  91 0005F          CMPB    (R0), #57                               ;
                                    02  1B 00062          BLEQU   4$                                      ;
                                    58  D4 00064 3$:       CLRL    VALID_LINE_FLAG                         ;
                        02      14  AE  E9 00066 4$:       BLBC    HAVE_LINE_NUM, 5$                       ; 1370
                                    58  D4 0006A          CLRL    VALID_LINE_FLAG                         ;
                    14  AE          01  D0 0006C 5$:       MOVL    #1, HAVE_LINE_NUM                       ; 1371
                    0C  AE          55  D0 00070          MOVL    I, LINE_NUM_LOC                         ; 1372
                    04  AE          01  CE 00074          MNEGL   #1, LINE_NUM                            ; 1378
                                    54  D4 00078          CLRL    NUMBER                                  ; 1379
                        50          06  D0 0007A          MOVL    #6, I                                   ; 1380
                                    52  11 0007D          BRB     9$                                      ;
                        51      08  AE  D0 0007F 6$:       MOVL    PNAME, R1                               ; 1382
                        2E          6041    91 00083          CMPB    (I)[R1], #46                            ;
                                    12  12 00087          BNEQ    7$                                      ;
            FFFFFFFF    8F      04  AE      D1 00089          CMPL    LINE_NUM, #-1                           ;
                                    08  12 00091          BNEQ    7$                                      ;
                    04  AE          54  D0 00093          MOVL    NUMBER, LINE_NUM                        ; 1385
                                    54  D4 00097          CLRL    NUMBER                                  ; 1386
                                    36  11 00099          BRB     9$                                      ; 1382
                        51      08  AE  D0 0009B 7$:       MOVL    PNAME, R1                               ; 1389
                        30          6041    91 0009F          CMPB    (I)[R1], #48                            ;
                                    28  1F 000A3          BLSSU   8$                                      ;
                        51      08  AE  D0 000A5          MOVL    PNAME, R1                               ;
                        39          6041    91 000A9          CMPB    (I)[R1], #57                            ;
                                    1E  1A 000AD          BGTRU   8$                                      ;
            000F4240    8F          54  D1 000AF          CMPL    NUMBER, #1000000                        ; 1390
                                    15  14 000B6          BGTR    8$                                      ;
        51              54          0A  C5 000B8          MULL3   #10, NUMBER, R1                         ; 1392
                        53      08  AE  D0 000BC          MOVL    PNAME, R3                               ;
                        52          6043    9A 000C0          MOVZBL  (I)[R3], R2                             ;
                        51          52  C0 000C4          ADDL2   R2, R1                                  ;
                        54      D0  A1  9E 000C7          MOVAB   -48(R1), NUMBER                         ;
                                    04  11 000CB          BRB     9$                                      ;
                                    58  D4 000CD 8$:       CLRL    VALID_LINE_FLAG                         ; 1396
                                    04  11 000CF          BRB     10$                                     ; 1395
        AA              50              59  F3 000D1 9$:       AOBLEQ  R9, I, 6$                               ; 1380
```

```
                    FFFFFFFF  8F         04  AE  D1 000D5 10$:   CMPL    LINE_NUM, #-1                          ; 1405
                                             08  12 000DD        BNEQ    11$                                    ;
                          04  AE             54  D0 000DF        MOVL    NUMBER, LINE_NUM                       ; 1408
                                             6E  D4 000E3        CLRL    STMT_NUM                               ; 1409
                                             03  11 000E5        BRB     12$                                    ; 1405
                              6E             54  D0 000E7 11$:   MOVL    NUMBER, STMT_NUM                       ; 1413
    FF42           55         01             56  F1 000EA 12$:   ACBL    R6, #1, I, 2$                          ; 1362
                              3A         14  AE  E9 000F0        BLBC    HAVE_LINE_NUM, 16$                     ; 1424
                                             50  D4 000F4        CLRL    R0                                     ; 1427
                              56         0C  AE  D1 000F6        CMPL    LINE_NUM_LOC, R6                       ;
                                             02  12 000FA        BNEQ    13$                                    ;
                                             50  D6 000FC        INCL    R0                                     ;
                          10  AE             50  D0 000FE 13$:   MOVL    R0, LINE_NUM_IS_LAST                   ;
  0C   AE     04   BC         08             08  ED 00102        CMPZV   #8, #8, @PATHNAME, LINE_NUM_LOC        ; 1428
                                             1B  19 00109        BLSS    14$                                    ;
       50     04   BC         08             08  EF 0010B        EXTZV   #8, #8, @PATHNAME, R0                  ; 1429
                                             50  D7 00111        DECL    R0                                     ;
                              50         0C  AE  D1 00113        CMPL    LINE_NUM_LOC, R0                       ;
                                             0D  19 00117        BLSS    14$                                    ;
  0C   AE     04   BC         08             08  ED 00119        CMPZV   #8, #8, @PATHNAME, LINE_NUM_LOC        ; 1430
                                             06  12 00120        BNEQ    15$                                    ;
                              02         10  AE  E8 00122        BLBS    LINE_NUM_IS_LAST, 15$                  ;
                                             58  D4 00126 14$:   CLRL    VALID_LINE_FLAG                        ; 1432
                              03             58  E8 00128 15$:   BLBS    VALID_LINE_FLAG, 16$                   ; 1434
                                           0234  31 0012B        BRW     40$                                    ;
                                             58  D4 0012E 16$:   CLRL    NCANDS                                 ; 1448
                                  00000000'  EF  D5 00130        TSTL    CANDLST                                ; 1449
                                             17  12 00136        BNEQ    17$                                    ;
                                             0B  DD 00138        PUSHL   #11                                    ; 1452
                   00000000G  00             01  FB 0013A        CALLS   #1, DBG$GET_MEMORY                     ;
                   00000000'  EF             50  D0 00141        MOVL    R0, CANDLST                            ;
                   00000000'  FF             0A  D0 00148        MOVL    #10, @CANDLST                          ; 1453
                              5B  00000000G  00  D0 0014F 17$:   MOVL    SCOPE$LIST, SCOPEPTR                   ; 1462
                                         60  AE  D4 00156        CLRL    HAVE_NUM_SCOPE                         ; 1463
                          08  AE             67  D0 00159        MOVL    (PATHVEC), PNAME                       ; 1464
                                         08  BE  95 0015D        TSTB    @PNAME                                 ; 1465
                                             51  12 00160        BNEQ    21$                                    ;
       00     04   BC         08             10  ED 00162        CMPZV   #16, #8, @PATHNAME, #0                 ; 1468
                                             09  12 00168        BNEQ    18$                                    ;
                              5B  00000000'  EF  9E 0016A        MOVAB   P.AAO, SCOPEPTR                        ; 1470
                                             3D  11 00171        BRB     20$                                    ;
       01     04   BC         08             10  ED 00173 18$:   CMPZV   #16, #8, @PATHNAME, #1                 ; 1472
                                             20  12 00179        BNEQ    19$                                    ;
                          60  AE             01  D0 0017B        MOVL    #1, HAVE_NUM_SCOPE                     ; 1475
                              5B  00000000'  EF  9E 0017F        MOVAB   NUMB_SCOPE, SCOPEPTR                   ; 1476
                   50         04  AC         04  C1 00186        ADDL3   #4, PATHNAME, R0                       ; 1477
                          0C  AB             60  D0 0018B        MOVL    (R0), 12(SCOPEPTR)                     ;
       02     04   BC         08             08  ED 0018F        CMPZV   #8, #8, @PATHNAME, #2                  ; 1478
                                             19  18 00195        BGEQ    20$                                    ;
                                             5B  D4 00197        CLRL    SCOPEPTR                               ;
                                             15  11 00199        BRB     20$                                    ; 1472
                                  00000000'  EF  9F 0019B 19$:   PUSHAB  P.AAP                                  ; 1482
                                             01  DD 001A1        PUSHL   #1                                     ;
                                  00028362   8F  DD 001A3        PUSHL   #164706                                ;
                   00000000G  00             03  FB 001A9        CALLS   #3, LIB$SIGNAL                         ;
                                           0140  31 001B0 20$:   BRW     36$                                    ; 1465
       01     04   BC         08             08  ED 001B3 21$:   CMPZV   #8, #8, @PATHNAME, #1                  ; 1491
```

```
                                                F5  15 001B9          BLEQ    20$                                                     ;
                                        01      0C  AE  D1 001BB          CMPL    LINE_NUM_LOC, #1                                        ;
                                                EF  13 001BF          BEQL    20$                                                     ;
        54      04      BC              08              08  EF 001C1          EXTZV   #8, #8, @PATHNAME, PATH_START_LOC               ; 1494
                                                54  D7 001C7          DECL    PATH_START_LOC                                          ;
                                        54      0C  AE  D1 001C9          CMPL    LINE_NUM_LOC, PATH_START_LOC                    ; 1495
                                                02  12 001CD          BNEQ    22$                                                     ;
                                                54  D7 001CF          DECL    PATH_START_LOC                                          ; 1497
                                    00000000'   EF  D4 001D1 22$:      CLRL    MODU_SCOPE+8                                            ; 1504
                                    00000000'   EF  D4 001D7          CLRL    NORM_SCOPE+8                                            ; 1505
                                        55      FC A744 D0 001DD          MOVL    -4(PATHVEC)[PATH_START_LOC], PATH_NAME_PTR      ; 1506
                                                55  DD 001E2          PUSHL   PATH_NAME_PTR                                           ; 1507
                        00000000G       00              01  FB 001E4          CALLS   #1, DBG$HASH_FIND_SETUP                         ;
                                                55  DD 001EB 23$:      PUSHL   PATH_NAME_PTR                                           ; 1514
                        00000000G       00              01  FB 001ED          CALLS   #1, DBG$HASH_FIND                               ;
                                20      AE              50  D0 001F4          MOVL    R0, RSTPTR                                      ;
                                                03  12 001F8          BNEQ    24$                                                     ; 1515
                                                00C5 31 001FA          BRW     34$                                                     ;
                                        59      20  AE  D0 001FD 24$:      MOVL    RSTPTR, RPTR                                    ; 1521
                                24      AE              54  D0 00201          MOVL    PATH_START_LOC, PINDEX                          ; 1522
                        50      20      AE              15  C1 00205 25$:      ADDL3   #21, RSTPTR, R0                                 ; 1525
                                DE                      60  E8 0020A          BLBS    (R0), 23$                                       ;
                        50      20      AE              14  C1 0020D          ADDL3   #20, RSTPTR, R0                                 ; 1526
                                01                      60  91 00212          CMPB    (R0), #1                                        ;
                                                1E  13 00215          BEQL    26$                                                     ;
                        50      20      AE              14  C1 00217          ADDL3   #20, RSTPTR, R0                                 ; 1527
                                02                      60  91 0021C          CMPB    (R0), #2                                        ;
                                                14  13 0021F          BEQL    26$                                                     ;
                        50      20      AE              14  C1 00221          ADDL3   #20, RSTPTR, R0                                 ; 1528
                                03                      60  91 00226          CMPB    (R0), #3                                        ;
                                                0A  13 00229          BEQL    26$                                                     ;
                        50      20      AE              14  C1 0022B          ADDL3   #20, RSTPTR, R0                                 ; 1529
                                07                      60  91 00230          CMPB    (R0), #7                                        ;
                                                B6  12 00233          BNEQ    23$                                                     ;
                                        50      24      AE  D0 00235 26$:      MOVL    PINDEX, R0                                      ; 1533
                                08      AE              FC A740 D0 00239          MOVL    -4(PATHVEC)[R0], PNAME                  ;
                                        0C      A9      DD 0023F          PUSHL   12(RPTR)                                        ; 1534
                        00000000G       00              01  FB 00242          CALLS   #1, DBG$GET_DST_NAME                            ;
                                3C      AE              50  D0 00249          MOVL    R0, RNAME                                       ;
                                        51      08      BE  9A 0024D          MOVZBL  @PNAME, R1                                      ; 1535
                                        50      3C      BE  9A 00251          MOVZBL  @RNAME, R0                                      ;
                        56      3C      AE              01  C1 00255          ADDL3   #1, RNAME, R6                                   ;
                        5A      08      AE              01  C1 0025A          ADDL3   #1, PNAME, R10                                  ;
        50              00              6A              51  2D 0025F          CMPC5   R1, (R10), #0, R0, (R6)                         ;
                                                66          00264                                                                   ;
                                                4E  12 00265          BNEQ    33$                                                     ;
                                        01      24  AE  D1 00267          CMPL    PINDEX, #1                                      ; 1544
                                                45  12 0026B          BNEQ    32$                                                     ;
                                0090    CE              20  AE  D0 0026D          MOVL    RSTPTR, MODRSTPTR                       ; 1547
                                        50      0090    CE  D0 00273 27$:      MOVL    MODRSTPTR, R0                           ; 1548
                                        01      14      A0  91 00278          CMPB    20(R0), #1                                      ;
                                                08  13 0027C          BEQL    28$                                                     ;
                                0090    CE      10      A0  D0 0027E          MOVL    16(R0), MODRSTPTR                               ; 1549
                                                ED  11 00284          BRB     27$                                                     ;
                                        5B 00000000'    EF  9E 00286 28$:      MOVAB   NORM_SCOPE, SCOPEPTR                            ; 1551
                                0090    CE      20      AE  D1 0028D          CMPL    RSTPTR, MODRSTPTR                               ; 1552
                                                07  12 00293          BNEQ    29$                                                     ;
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                5B 00000000'   EF   9E 00295                 MOVAB   MODU_SCOPE, SCOPEPTR                                ;
                        08     AB   D5 0029C 29$:            TSTL    8(SCOPEPTR)                                         ; 1553
                        03     13   0029F                    BEQL    30$                                                 ;
                      06BC     31   002A1                    BRW     130$                                                ;
             08 AB      20     AE   D0 002A4 30$:            MOVL    RSTPTR, 8(SCOPEPTR)                                 ; 1561
             0C AB    0090     CE   D0 002A9                 MOVL    MODRSTPTR, 12(SCOPEPTR)                             ; 1562
                      FF39     31   002AF 31$:               BRW     23$                                                 ; 1546
                        24     AE   D7 002B2 32$:            DECL    PINDEX                                              ; 1569
                01      14     A9   91 002B5 33$:            CMPB    20(RPTR), #1                                        ; 1575
                        F4     13   002B9                    BEQL    31$                                                 ;
                59      10     A9   D0 002BB                 MOVL    16(RPTR), RPTR                                      ; 1576
                      FF43     31   002BF                    BRW     25$                                                 ; 1523
                        5B     D4   002C2 34$:               CLRL    SCOPEPTR                                            ; 1586
                00000000'      EF   D4 002C4                 CLRL    MODU_SCOPE                                          ; 1587
                00000000'      EF   D5 002CA                 TSTL    NORM_SCOPE+8                                        ; 1588
                        12     13   002D0                    BEQL    35$                                                 ;
00000000'    EF 00000000'      EF   9E 002D2                 MOVAB   NORM_SCOPE, MODU_SCOPE                              ; 1591
             5B 00000000'      EF   9E 002DD                 MOVAB   NORM_SCOPE, SCOPEPTR                                ; 1592
                00000000'      EF   D5 002E4 35$:            TSTL    MODU_SCOPE+8                                        ; 1595
                        07     13   002EA                    BEQL    36$                                                 ;
                5B 00000000'   EF   9E 002EC                 MOVAB   MODU_SCOPE, SCOPEPTR                                ;
             28 AE 00000000G    00   D0 002F3 36$:            MOVL    RST$START_ADDR, NEXTSETMOD                          ; 1603
                        74     AE   7C 002FB                 CLRQ    REG_SCOPE                                           ; 1604
                        64     AE   D4 002FE                 CLRL    FIRST_MODPTR                                        ; 1606
             6C AE                5B   D0 00301                 MOVL    SCOPEPTR, SCOPE_START_PTR                           ; 1607
                50 00000000'   EF   9E 00305                 MOVAB   MODU_SCOPE, R0                                      ; 1608
                50                   5B   D1 0030C                 CMPL    SCOPEPTR, R0                                        ;
                                     10   12 0030F                 BNEQ    37$                                                 ;
                00000000'            EF   D5 00311                 TSTL    MODU_SCOPE                                          ;
                                     08   13 00317                 BEQL    37$                                                 ;
             6C AE 00000000'         EF   D0 00319                 MOVL    MODU_SCOPE, SCOPE_START_PTR                         ; 1610
                        5C           AE   D4 00321 37$:            CLRL    HAVE_SCOPE                                          ; 1623
                                     5B   D5 00324 38$:            TSTL    SCOPEPTR                                            ; 1635
                                     03   13 00326                 BEQL    39$                                                 ;
                                   00BE   31 00328                 BRW     45$                                                 ;
                              78     AE   DD 0032B 39$:            PUSHL   REG_LINE_LEX_PTR                                    ; 1643
                              70     AE   DD 0032E                 PUSHL   SCOPE_START_PTR                                     ;
                              04     AC   DD 00331                 PUSHL   PATHNAME                                            ; 1642
          0000V CF                        03   FB 00334                 CALLS   #3, GET_REGISTER_SYMID                              ;
            54 AE                         50   D0 00339                 MOVL    R0, REGISTER_SYMID                                  ;
                                          2A   12 0033D                 BNEQ    41$                                                 ; 1651
                1F            14     AE   E9 0033F                 BLBC    HAVE_LINE_NUM, 40$                                  ; 1654
                              64     AE   D5 00343                 TSTL    FIRST_MODPTR                                        ;
                                          1A   13 00346                 BEQL    40$                                                 ;
                                          01   DD 00348                 PUSHL   #1                                                  ; 1656
                                        0098   CE   9F 0034A                 PUSHAB  LINEEND                                             ;
                                        00A0   CE   9F 0034E                 PUSHAB  LINESTART                                           ;
                              70     AE   DD 00352                 PUSHL   FIRST_MODPTR                                        ; 1657
                              10     AE   DD 00355                 PUSHL   STMT_NUM                                            ; 1656
                              18     AE   DD 00358                 PUSHL   LINE_NUM                                            ;
       00000000G    00                    06   FB 0035B                 CALLS   #6, DBG$LINE_TO_PC_LOOKUP                           ;
                              08     BC   D4 00362 40$:            CLRL    @SYMID                                              ; 1659
                              0C     BC   D4 00365                 CLRL    @KIND                                               ; 1660
                                          04   00368                 RET                                                         ; 1653
                08 BC         54     AE   D0 00369 41$:            MOVL    REGISTER_SYMID, @SYMID                              ; 1668
          50    54 AE                   14   C1 0036E                 ADDL3   #20, REGISTER_SYMID, R0                             ; 1669
                0C BC                   60   9A 00373                 MOVZBL  (R0), @KIND                                         ;
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                                    10   AC   D5 00377          TSTL    OUT_SCOPE_STATE                          ; 1675
                                    03   13   0037A            BEQL    42$                                      ;
                                    10   BC   D4 0037C          CLRL    @OUT_SCOPE_STATE                         ; 1677
                                    14   AC   D5 0037F 42$:     TSTL    OUT_SCOPE                                ; 1678
                                    03   13   00382            BEQL    43$                                      ;
                                    14   BC   D4 00384          CLRL    @OUT_SCOPE                               ; 1680
                          50 00000000G   00   D0 00387 43$:     MOVL    RST$REF_LIST, R0                         ; 1688
                          60       04    A0   D1 0038E          CMPL    4(R0), (R0)                              ;
                                         40   12 00392          BNEQ    44$                                      ;
                          60             14   C0 00394          ADDL2   #20, (R0)                                ; 1691
                7E        60             02   C1 00397          ADDL3   #2, (R0), -(SP)                          ; 1692
                00000000G 00             01   FB 0039B          CALLS   #1, DBG$GET_MEMORY                       ;
                      70  AE             50   D0 003A2          MOVL    R0, NEWREFLIST                           ;
                      40  AE 00000000G    00   D0 003A6          MOVL    RST$REF_LIST, 64(SP)                     ; 1693
                51    40  AE             04   C1 003AE          ADDL3   #4, 64(SP), R1                           ;
                          50             61   D0 003B3          MOVL    (R1), R0                                 ;
                          50             04   C4 003B6          MULL2   #4, R0                                   ;
                          50             08   C0 003B9          ADDL2   #8, R0                                   ;
          70    BE        40   BE        50   28 003BC          MOVC3   R0, @64(SP), @NEWREFLIST                 ;
                                    40   AE   DD 003C2          PUSHL   64(SP)                                   ; 1694
                00000000G   00             01   FB 003C5          CALLS   #1, DBG$REL_MEMORY                       ;
                00000000G   00       70    AE   D0 003CC          MOVL    NEWREFLIST, RST$REF_LIST                 ; 1695
                          50 00000000G   00   D0 003D4 44$:     MOVL    RST$REF_LIST, R0                         ; 1698
                                    04   A0   D6 003DB          INCL    4(R0)                                    ;
                          51        04   A0   D0 003DE          MOVL    4(R0), R1                                ; 1699
                       04 A041      20   AE   D0 003E2          MOVL    RSTPTR, 4(R0)[R1]                        ;
                                         04   003E8            RET                                              ; 1637
                                    50   D4 003E9 45$:     CLRL    R0                                       ; 1707
                       6C   AE           5B   D1 003EB          CMPL    SCOPEPTR, SCOPE_START_PTR                ;
                                         02   12 003EF          BNEQ    46$                                      ;
                                         50   D6 003F1          INCL    R0                                       ;
                       74   AE           50   D0 003F3 46$:     MOVL    R0, REG_SCOPE                            ;
                       50   AE      04   AB   D0 003F7          MOVL    4(SCOPEPTR), SCOPE_STATE                 ; 1712
                03             01   50   AE   CF 003FC          CASEL   SCOPE_STATE, #1, #3                      ; 1713
          008F        003A       0019        0008     00401 47$:     .WORD   48$-47$,-                                ;
                                                                            49$-47$,-                                ;
                                                                            52$-47$,-                                ;
                                                                            57$-47$                                  ;
                008C   CE      08   AB   7D 00409 48$:     MOVQ    8(SCOPEPTR), SCOPE                       ; 1724
                       50  0090   CE   D0 0040F          MOVL    MODRSTPTR, R0                            ; 1726
                       20    28   A0   E9 00414          BLBC    40(R0), 51$                              ;
                                    1A   11 00418          BRB     50$                                      ;
                             0088   CE   9F 0041A 49$:     PUSHAB  NUMSCP_INVOC_NUM                         ; 1739
                             0090   CE   9F 0041E          PUSHAB  SCOPE                                    ;
                             0098   CE   9F 00422          PUSHAB  MODRSTPTR                                ;
                               0C   AB   DD 00426          PUSHL   12(SCOPEPTR)                             ;
                0000V          CF        04   FB 00429          CALLS   #4, DBG$STA_NUMBERED_SCOPE               ;
                             008C   CE   D5 0042E          TSTL    SCOPE                                    ; 1741
                                    04   13 00432          BEQL    51$                                      ;
                       5C   AE           01   D0 00434 50$:     MOVL    #1, HAVE_SCOPE                           ;
                                   00AB   31 00438 51$:     BRW     63$                                      ; 1742
                       08   AE           67   D0 0043B 52$:     MOVL    (PATHVEC), PNAME                         ; 1753
                                    50   04   BC   9A 0043F          MOVZBL  @PATHNAME, R0                            ; 1754
          50    04   BC              08        08   ED 00443          CMPZV   #8, #8, @PATHNAME, R0                    ;
                                         ED   12 00449          BNEQ    51$                                      ;
                                    02   04   BC   91 0044B          CMPB    @PATHNAME, #2                            ; 1755
                                         05   12 0044F          BNEQ    53$                                      ;
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                                08 BE  95 00451          TSTB    @PNAME                                          ;
                                06 13  00454             BEQL    54$                                             ;
                          01    04 BC  91 00456 53$:     CMPB    @PATHNAME, #1                                   ; 1756
                                DC 12  0045A             BNEQ    51$                                             ;
                          50    04 BC  9A 0045C 54$:     MOVZBL  @PATHNAME, R0                                   ; 1760
                                FC A740 DD 00460         PUSHL   -4(PATHVEC)[R0]                                 ;
                     0000V CF         01 FB  00464       CALLS   #1, DBG$STA_LOOKUP_GBL                          ;
                       20 AE          50 D0  00469       MOVL    R0, RSTPTR                                      ;
                                      77 13  0046D       BEQL    63$                                             ; 1761
                       08 BC    20 AE D0  0046F          MOVL    RSTPTR, @SYMID                                  ; 1764
                 50    20 AE       14 C1  00474          ADDL3   #20, RSTPTR, R0                                 ; 1765
                       0C BC       60 9A  00479          MOVZBL  (R0), @KIND                                     ;
                                10 AC  D5  0047D          TSTL    OUT_SCOPE_STATE                                 ; 1770
                                04 13  00480              BEQL    55$                                             ;
                       10 BC       03 D0  00482          MOVL    #3, @OUT_SCOPE_STATE                            ; 1772
                                14 AC  D5  00486 55$:     TSTL    OUT_SCOPE                                       ; 1773
                                01 12  00489              BNEQ    56$                                             ;
                                       04  0048B          RET                                                     ;
                                14 BC  D4  0048C 56$:     CLRL    @OUT_SCOPE                                      ; 1775
                                       04  0048F          RET                                                     ; 1763
            00000000G   00      28 AE  D1  00490 57$:     CMPL    NEXTSETMOD, RST$START_ADDR                      ; 1798
                                18 12  00498              BNEQ    59$                                             ;
                                28 AE  D5  0049A 58$:     TSTL    NEXTSETMOD                                      ; 1801
                                13 13  0049D              BEQL    59$                                             ;
                 50       28 AE       28 C1  0049F       ADDL3   #40, NEXTSETMOD, R0                             ; 1803
                          0B           60 E8  004A4       BLBS    (R0), 59$                                       ;
                 50       28 AE       10 C1  004A7       ADDL3   #16, NEXTSETMOD, R0                             ; 1804
                          28 AE       60 D0  004AC       MOVL    (R0), NEXTSETMOD                                ;
                                      E8 11  004B0       BRB     58$                                             ; 1801
                     0090 CE      28 AE  D0  004B2 59$:     MOVL    NEXTSETMOD, MODRSTPTR                           ; 1815
                     008C CE    0090 CE  D0  004B8          MOVL    MODRSTPTR, SCOPE                                ; 1816
                                28 AE  D5  004BF 60$:     TSTL    NEXTSETMOD                                      ; 1817
                                13 13  004C2              BEQL    61$                                             ;
                 50       28 AE       10 C1  004C4       ADDL3   #16, NEXTSETMOD, R0                             ; 1819
                          28 AE       60 D0  004C9       MOVL    (R0), NEXTSETMOD                                ;
                                      08 13  004CD       BEQL    61$                                             ; 1820
                 50       28 AE       28 C1  004CF       ADDL3   #40, NEXTSETMOD, R0                             ; 1821
                          E8           60 E9  004D4       BLBC    (R0), 60$                                       ;
                                0090 CE  D5  004D7 61$:     TSTL    MODRSTPTR                                       ; 1824
                                04 13  004DB              BEQL    62$                                             ;
                       5C AE          01 D0  004DD       MOVL    #1, HAVE_SCOPE                                  ;
                                28 AE  D5  004E1 62$:     TSTL    NEXTSETMOD                                      ; 1825
                                03 12  004E4              BNEQ    64$                                             ;
                          5B           6B D0  004E6 63$:     MOVL    (SCOPEPTR), SCOPEPTR                            ;
                          03     5C AE  E8  004E9 64$:     BLBS    HAVE_SCOPE, 65$                                 ; 1834
                                FE34 31  004ED             BRW     38$                                             ;
                          52    0090 CE  D0  004F0 65$:     MOVL    MODRSTPTR, R2                                   ; 1842
                 0B       28 A2       01 E0  004F5       BBS     #1, 40(R2), 66$                                 ;
                                      7E D4  004FA       CLRL    -(SP)                                           ; 1844
                                      52 DD  004FC       PUSHL   R2                                              ;
            00000000G   00            02 FB  004FE       CALLS   #2, DBG$RST_BUILD                               ;
                                10 AC  D5  00505 66$:     TSTL    OUT_SCOPE_STATE                                 ; 1850
                                05 13  00508              BEQL    67$                                             ;
                       10 BC    50 AE D0  0050A          MOVL    SCOPE_STATE, @OUT_SCOPE_STATE                   ; 1852
                                14 AC  D5  0050F 67$:     TSTL    OUT_SCOPE                                       ; 1853
                                06 13  00512              BEQL    68$                                             ;
                       14 BC  008C CE  D0  00514          MOVL    SCOPE, @OUT_SCOPE                               ; 1855
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                    03        14    AE   E8 0051A 68$:    BLBS    HAVE_LINE_NUM, 69$                      ; 1862
                              00A3  31   0051E             BRW     79$                                     ;
                              64    AE   D5 00521 69$:    TSTL    FIRST_MODPTR                            ; 1871
                                    04   12 00524         BNEQ    70$                                     ;
                          64    AE        52 00526         MOVL    R2, FIRST_MODPTR                        ;
                                    7E   D4 0052A 70$:    CLRL    -(SP)                                   ; 1876
                              0098  CE   9F 0052C         PUSHAB  LINEEND                                 ;
                              00A0  CE   9F 00530         PUSHAB  LINESTART                               ;
                                    52   DD 00534         PUSHL   R2                                      ; 1877
                              10    AE   DD 00536         PUSHL   STMT_NUM                                ; 1876
                              18    AE   DD 00539         PUSHL   LINE_NUM                                ;
                00000000G     00         06 FB 0053C         CALLS   #6, DBG$LINE_TO_PC_LOOKUP           ;
                    0084      CE         50 D0 00543         MOVL    R0, STATUS                          ;
                      38      AE   18    A2 D0 00548         MOVL    24(R2), SATPTR                      ; 1884
                              03   0084  CE E8 0054D         BLBS    STATUS, 71$                         ; 1885
                              38    AE   D4 00552         CLRL    SATPTR                                  ;
                              48    AE   D4 00555 71$:    CLRL    LINE_LEX_PTR                            ; 1886
                              38    AE   D5 00558 72$:    TSTL    SATPTR                                  ; 1887
                                    5E   13 0055B         BEQL    78$                                     ;
                50    38      AE        04 C1 0055D         ADDL3   #4, SATPTR, R0                      ; 1889
                    0098      CE        60 D1 00562         CMPL    (R0), LINESTART                     ;
                                    52   14 00567         BGTR    78$                                     ;
                50    38      AE        0C C1 00569         ADDL3   #12, SATPTR, R0                     ; 1890
                      20      AE        60 D0 0056E         MOVL    (R0), RSTPTR                        ;
                50    38      AE        08 C1 00572         ADDL3   #8, SATPTR, R0                      ; 1891
                    0098      CE        60 D1 00577         CMPL    (R0), LINESTART                     ;
                                    36   19 0057C         BLSS    77$                                     ;
                50    20      AE        14 C1 0057E         ADDL3   #20, RSTPTR, R0                     ; 1892
                              02        60 91 00583         CMPB    (R0), #2                            ;
                                    0A   13 00586         BEQL    73$                                     ;
                50    20      AE        14 C1 00588         ADDL3   #20, RSTPTR, R0                     ; 1893
                              03        60 91 0058D         CMPB    (R0), #3                            ;
                                    22   12 00590         BNEQ    77$                                     ;
                                    48   AE   D5 00592 73$:    TSTL    LINE_LEX_PTR                        ; 1896
                                    10   13 00595         BEQL    75$                                     ;
                                    59   20   AE D0 00597         MOVL    RSTPTR, RPTR                    ; 1902
                                    01   14   A9 91 0059B 74$:    CMPB    20(RPTR), #1                    ; 1903
                                    13   13 0059F         BEQL    77$                                     ;
                              48    AE        59 D1 005A1         CMPL    RPTR, LINE_LEX_PTR              ; 1905
                                    07   12 005A5         BNEQ    76$                                     ;
                              48    AE   20   AE D0 005A7 75$:    MOVL    RSTPTR, LINE_LEX_PTR            ; 1908
                                    06   11 005AC         BRB     77$                                     ; 1907
                                    59   10   A9 D0 005AE 76$:    MOVL    16(RPTR), RPTR                  ; 1912
                                    E7   11 005B2         BRB     74$                                     ; 1903
                              38    AE   38   BE D0 005B4 77$:    MOVL    @SATPTR, SATPTR                 ; 1919
                                    9D   11 005B9         BRB     72$                                     ; 1887
                                    05   74   AE E9 005BB 78$:    BLBC    REG_SCOPE, 79$                  ; 1927
                              78    AE   48   AE D0 005BF         MOVL    LINE_LEX_PTR, REG_LINE_LEX_PTR  ;
                                         18   AE DD 005C4 79$:    PUSHL   NAMEPTR                         ; 1937
                00000000G     00         01 FB 005C7         CALLS   #1, DBG$HASH_FIND_SETUP             ;
                              0A   10   AE E9 005CE 80$:    BLBC    LINE_NUM_IS_LAST, 81$               ; 1946
                      20      AE   48   AE D0 005D2         MOVL    LINE_LEX_PTR, RSTPTR                ; 1949
                                   48   AE D4 005D7         CLRL    LINE_LEX_PTR                        ; 1950
                                    0E   11 005DA         BRB     82$                                     ; 1946
                                         18   AE DD 005DC 81$:    PUSHL   NAMEPTR                         ; 1958
                00000000G     00         01 FB 005DF         CALLS   #1, DBG$HASH_FIND                   ;
                      20      AE        50 D0 005E6         MOVL    R0, RSTPTR                          ;
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                                20   AE   D5 005EA 82$:    TSTL    RSTPTR                          ; 1964
                                03   12  005ED            BNEQ    83$
                              02BA   31  005EF            BRW     116$
                                56   D4  005F2 83$:       CLRL    STKPTR                          ; 1971
                            59  20   AE  D0  005F4        MOVL    RSTPTR, RPTR                    ; 1972
                         24 AE  04   BC  9A  005F8        MOVZBL  @PATHNAME, PINDEX               ; 1973
                    50   20 AE       14  C1  005FD        ADDL3   #20, RSTPTR, R0                 ; 1981
                         40 AE       60  9E  00602        MOVAB   (R0), 64(SP)
                    C3   40 BE       08  E0  00606 84$:   BBS     #8, @64(SP), 80$
                            01  40   BE  91  0060B        CMPB    @64(SP), #1                     ; 1982
                                BD   13  0060F            BEQL    80$
                            06  1C   AC  E8  00611        BLBS    TYPE_FLAG, 85$                  ; 1983
                            07  40   BE  91  00615        CMPB    @64(SP), #7
                                B3   13  00619            BEQL    80$
                            0C  1C   AE  E9  0061B 85$:   BLBC    SET_SCOPE, 86$                  ; 1991
                            02  40   BE  91  0061F        CMPB    @64(SP), #2                     ; 1994
                                06   13  00623            BEQL    86$
                            03  40   BE  91  00625        CMPB    @64(SP), #3                     ; 1995
                                A3   12  00629            BNEQ    80$
                                56   D6  0062B 86$:       INCL    STKPTR                          ; 2005
                    00000064    8F       56  D1  0062D    CMPL    STKPTR, #100                    ; 2006
                                98   18  00634            BGEQ    80$
                              00A0 CE46  7F  00636        PUSHAQ  SYMSTACK[STKPTR]                ; 2007
                            9E  59   D0  0063B            MOVL    RPTR, @(SP)+
                            54  00A4 CE46  7E  0063E      MOVAQ   SYMSTACK+4[STKPTR], R4          ; 2008
                                64   D4  00644            CLRL    (R4)
                            07  14   AE  E9  00646        BLBC    HAVE_LINE_NUM, 87$              ; 2015
                         0C AE  24   AE  D1  0064A        CMPL    PINDEX, LINE_NUM_LOC
                                0A   13  0064F            BEQL    88$
                            09  60   AE  E9  00651 87$:   BLBC    HAVE_NUM_SCOPE, 89$             ; 2016
                            01  24   AE  D1  00655        CMPL    PINDEX, #1
                                03   12  00659            BNEQ    89$
                                24   AE  D7  0065B 88$:   DECL    PINDEX                          ; 2018
                            50  24   AE  D0  0065E 89$:   MOVL    PINDEX, R0                      ; 2026
                         08 AE  FC A740  D0  00662        MOVL    -4(PATHVEC)[R0], PNAME
                                55   D4  00668            CLRL    R5                              ; 2027
                                24   AE  D5  0066A        TSTL    PINDEX
                                06   12  0066D            BNEQ    90$
                                55   D6  0066F            INCL    R5
                         08 AE       67  D0  00671        MOVL    (PATHVEC), PNAME
                                0C   A9  DD  00675 90$:   PUSHL   12(RPTR)                        ; 2028
                    00000000G   00       01  FB  00678    CALLS   #1, DBG$GET_DST_NAME
                            3C  AE       50  D0  0067F    MOVL    R0, RNAME
                            51  08   BE  9A  00683        MOVZBL  @PNAME, R1                      ; 2029
                            50  3C   BE  9A  00687        MOVZBL  @RNAME, R0
                      7E    3C  AE       01  C1  0068B    ADDL3   #1, RNAME, -(SP)
                      7E    0C  AE       01  C1  00690    ADDL3   #1, PNAME, -(SP)
                50          00           51  2D  00695    CMPC5   R1, @(SP)+, #0, R0, @(SP)+
                                         9E  0069A
                                06   13  0069B            BEQL    91$
                            03  55   E8  0069D            BLBS    R5, 91$                         ; 2030
                              01C1   31  006A0            BRW     112$
                            64  24   AE  B0  006A3 91$:   MOVW    PINDEX, (R4)                    ; 2037
24  AE      04  BC          08       08  ED  006A7        CMPZV   #8, #8, @PATHNAME, PINDEX       ; 2044
                                03   18  006AE            BGEQ    93$
                              01AA   31  006B0 92$:       BRW     111$
                            0A  14   A9  91  006B3 93$:   CMPB    20(RPTR), #10                   ; 2045
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                        F7  13 006B7          BEQL    92$                                                     ;
                34  AE  20  AE  D0 006B9       MOVL    RSTPTR, SYMSCOPE                                        ; 2052
                    01  40  BE  91 006BE       CMPB    @64(SP), #1                                             ; 2053
                        09  13 006C2          BEQL    94$                                                     ;
          50    20  AE      10  C1 006C4       ADDL3   #16, RSTPTR, R0                                         ; 2055
                34  AE      60  D0 006C9       MOVL    (R0), SYMSCOPE                                          ;
          50    34  AE      14  C1 006CD 94$:   ADDL3   #20, SYMSCOPE, R0                                       ; 2057
                    07      60  91 006D2       CMPB    (R0), #7                                                ;
                        09  12 006D5          BNEQ    95$                                                     ;
          50    34  AE      10  C1 006D7       ADDL3   #16, SYMSCOPE, R0                                       ; 2059
                34  AE      60  D0 006DC       MOVL    (R0), SYMSCOPE                                          ;
                    04  50  AE  D1 006E0 95$:   CMPL    SCOPE_STATE, #4                                         ; 2068
                        04  13 006E4          BEQL    96$                                                     ;
                    15  10  AE  E9 006E6       BLBC    LINE_NUM_IS_LAST, 97$                                   ;
          50    34  AE      14  C1 006EA 96$:   ADDL3   #20, SYMSCOPE, R0                                       ; 2071
                    01      60  91 006EF       CMPB    (R0), #1                                                ;
                        0B  13 006F2          BEQL    97$                                                     ;
          50    34  AE      10  C1 006F4       ADDL3   #16, SYMSCOPE, R0                                       ; 2072
                34  AE      60  D0 006F9       MOVL    (R0), SYMSCOPE                                          ;
                        EB  11 006FD          BRB     96$                                                     ;
                2C  AE  008C  CE  D0 006FF 97$:   MOVL    SCOPE, SCPTR                                        ; 2079
                        0080  CE  D4 00705       CLRL    DEFDEPTH                                            ; 2080
                58  AE      01  D0 00709       MOVL    #1, IN_SCOPE                                            ; 2081
                34  AE  2C  AE  D1 0070D 98$:   CMPL    SCPTR, SYMSCOPE                                         ; 2084
                        1E  13 00712          BEQL    100$                                                    ;
          50    2C  AE      14  C1 00714       ADDL3   #20, SCPTR, R0                                          ; 2085
                    01      60  91 00719       CMPB    (R0), #1                                                ;
                        05  12 0071C          BNEQ    99$                                                     ;
                        58  AE  D4 0071E       CLRL    IN_SCOPE                                                ; 2088
                        0F  11 00721          BRB     100$                                                    ; 2087
          50    2C  AE      10  C1 00723 99$:   ADDL3   #16, SCPTR, R0                                         ; 2092
                2C  AE      60  D0 00728       MOVL    (R0), SCPTR                                             ;
                        0080  CE  D6 0072C       INCL    DEFDEPTH                                            ; 2093
                        DB  11 00730          BRB     98$                                                     ; 2082
                    32  14  AE  E9 00732 100$:   BLBC    HAVE_LINE_NUM, 103$                                 ; 2101
                    2E  58  AE  E9 00736       BLBC    IN_SCOPE, 103$                                          ;
                    2A  10  AE  E8 0073A       BLBS    LINE_NUM_IS_LAST, 103$                                  ;
                        58  AE  D4 0073E       CLRL    IN_SCOPE                                                ; 2104
                2C  AE  20  AE  D0 00741       MOVL    RSTPTR, SCPTR                                           ; 2105
          50    2C  AE      14  C1 00746 101$:  ADDL3   #20, SCPTR, R0                                          ; 2106
                    01      60  91 0074B       CMPB    (R0), #1                                                ;
                        18  13 0074E          BEQL    103$                                                    ;
                48  AE  2C  AE  D1 00750       CMPL    SCPTR, LINE_LEX_PTR                                     ; 2108
                        06  12 00755          BNEQ    102$                                                    ;
                58  AE      01  D0 00757       MOVL    #1, IN_SCOPE                                            ; 2111
                        0B  11 0075B          BRB     103$                                                    ; 2110
          50    2C  AE      10  C1 0075D 102$:  ADDL3   #16, SCPTR, R0                                         ; 2115
                2C  AE      60  D0 00762       MOVL    (R0), SCPTR                                             ;
                        DE  11 00766          BRB     101$                                                    ; 2106
                    03  58  AE  E8 00768 103$:  BLBS    IN_SCOPE, 104$                                          ; 2125
                        009F  31 0076C       BRW     108$                                                    ;
          7E        56      01  78 0076F 104$:  ASHL    #1, STKPTR, -(SP)                                       ; 2132
                    6E      02  C0 00773       ADDL2   #2, (SP)                                                ;
    00000000G   00          01  FB 00776       CALLS   #1, DBG$GET_MEMORY                                      ;
                30  AE      50  D0 0077D       MOVL    R0, CANDBLK                                             ;
                            5A  D4 00781       CLRL    J                                                       ; 2133
                            50  D4 00783       CLRL    I                                                       ; 2134
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                                    28  11 00785          BRB     106$                                                    ;
                                00A6 CE40  7F 00787 105$:  PUSHAQ  SYMSTACK+6[I]                                           ; 2136
                                    9E  B5 0078C          TSTW    @(SP)+                                                  ;
                                    1F  12 0078E          BNEQ    106$                                                    ;
                                  30 BE4A  7F 00790          PUSHAQ  @CANDBLK[J]                                           ; 2139
                                00A4 CE40  7F 00794          PUSHAQ  SYMSTACK[I]                                           ;
                             9E           9E  D0 00799          MOVL    @(SP)+, @(SP)+                                        ;
                51        30 AE           04  C1 0079C          ADDL3   #4, CANDBLK, R1                                       ; 2140
                             52        614A  7E 007A1          MOVAQ   (R1)[J], R2                                           ;
                                00A4 CE40  7F 007A5          PUSHAQ  SYMSTACK+4[I]                                         ;
                             62           9E  3C 007AA          MOVZWL  @(SP)+, (R2)                                          ;
                                          5A  D6 007AD          INCL    J                                                     ; 2141
                D4           50           56  F3 007AF 106$:    AOBLEQ  STKPTR, I, 105$                                       ; 2134
                                  30 BE4A  7F 007B3          PUSHAQ  @CANDBLK[J]                                           ; 2146
                                    9E  D4 007B7          CLRL    @(SP)+                                                  ;
                50        30 AE           04  C1 007B9          ADDL3   #4, CANDBLK, R0                                       ; 2147
                             51        604A  7E 007BE          MOVAQ   (R0)[J], R1                                           ;
                             61      0080 CE  D0 007C2          MOVL    DEFDEPTH, (R1)                                        ;
                                          58  D6 007C7          INCL    NCANDS                                                ; 2154
                             50 00000000' EF  D0 007C9          MOVL    CANDLST, R0                                           ; 2155
                             60           58  D1 007D0          CMPL    NCANDS, (R0)                                          ;
                                          30  15 007D3          BLEQ    107$                                                  ;
                             60           0A  C0 007D5          ADDL2   #10, (R0)                                             ; 2158
                          7C AE           50  D0 007D8          MOVL    R0, OLDCAND                                           ; 2159
                7E           60           01  C1 007DC          ADDL3   #1, (R0), -(SP)                                       ; 2160
                   00000000G 00           01  FB 007E0          CALLS   #1, DBG$GET_MEMORY                                    ;
                   00000000' EF           50  D0 007E7          MOVL    R0, CANDLST                                           ;
                50           58           02  78 007EE          ASHL    #2, NCANDS, R0                                        ; 2161
00000000'       FF        7C BE           50  28 007F2          MOVC3   R0, @OLDCAND, @CANDLST                                ;
                             7C AE        DD  007FB             PUSHL   OLDCAND                                               ; 2162
                   00000000G 00           01  FB 007FE          CALLS   #1, DBG$REL_MEMORY                                    ;
                   00000000'FF48          30  AE  D0 00805 107$:  MOVL    CANDBLK, @CANDLST[NCANDS]                             ; 2165
                                          56  D5 0080E 108$:    TSTL    STKPTR                                                ; 2175
                                          23  15 00810          BLEQ    110$                                                  ;
                                00A6 CE46  7F 00812          PUSHAQ  SYMSTACK+6[STKPTR]                                    ; 2177
                             50           9E  3C 00817          MOVZWL  @(SP)+, R0                                            ;
                                          15  13 0081A          BEQL    109$                                                  ;
                          44 AE           50  D0 0081C          MOVL    R0, TPINDEX                                           ; 2180
                                00A0 CE46  7F 00820          PUSHAQ  SYMSTACK[STKPTR]                                      ; 2181
                             59           9E  D0 00825          MOVL    @(SP)+, RPTR                                          ;
44 AE        1A A9           10           00  ED 00828          CMPZV   #0, #16, 26(RPTR), TPINDEX                            ; 2182
                                          04  14 0082F          BGTR    110$                                                  ;
                                          56  D7 00831 109$:    DECL    STKPTR                                                ; 2185
                                          D9  11 00833          BRB     108$                                                  ; 2175
                                          56  D5 00835 110$:    TSTL    STKPTR                                                ; 2188
                                          4B  13 00837          BEQL    113$                                                  ;
                                00A6 CE46  7F 00839          PUSHAQ  SYMSTACK+6[STKPTR]                                    ; 2196
                9E           48 AE           01  A1 0083E          ADDW3   #1, TPINDEX, @(SP)+                                   ;
                             68 AE        1C A9  D0 00843          MOVL    28(RPTR), TPTR                                        ; 2197
                             50           44 AE  D0 00848          MOVL    TPINDEX, R0                                           ; 2198
                             59           68 BE40  D0 0084C          MOVL    @TPTR[R0], RPTR                                       ;
                                00A4 CE46  7F 00851          PUSHAQ  SYMSTACK+4[STKPTR]                                    ; 2199
                             24 AE           9E  3C 00856          MOVZWL  @(SP)+, PINDEX                                        ;
                                          24 AE  D6 0085A          INCL    PINDEX                                                ;
                             03           24 AE  F4 0085D 111$:    SOBGEQ  PINDEX, 112$                                          ; 2207
                                          24 AE  D4 00861          CLRL    PINDEX                                                ; 2208
                             01           14 A9  91 00864 112$:    CMPB    20(RPTR), #1                                          ; 2217
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                                    1A  13 00868          BEQL    113$                                                    ;
                              59    10  A9 D0 0086A          MOVL    16(RPTR), RPTR                                          ; 2218
                              07    14  A9 91 0086E          CMPB    20(RPTR), #7                                            ; 2226
                                    35  12 00872          BNEQ    115$                                                    ;
                                    1C  A9 D5 00874          TSTL    28(RPTR)                                                ; 2229
                                    0B  13 00877          BEQL    113$                                                    ;
                                        56 D6 00879          INCL    STKPTR                                                  ; 2230
                        00000064    8F  56 D1 0087B          CMPL    STKPTR, #100                                            ; 2231
                                    03  19 00882          BLSS    114$                                                    ;
                                  FD47  31 00884 113$:       BRW     80$                                                     ;
                                00A0 CE46 7F 00887 114$:       PUSHAQ  SYMSTACK[STKPTR]                                        ; 2232
                              9E    59  D0 0088C          MOVL    RPTR, @(SP)+                                            ;
                                00A4 CE46 7F 0088F          PUSHAQ  SYMSTACK+4[STKPTR]                                      ; 2233
                              9E    28  AE B0 00894          MOVW    PINDEX, @(SP)+                                          ;
                                00A6 CE46 7F 00898          PUSHAQ  SYMSTACK+6[STKPTR]                                      ; 2234
                              9E    01  B0 0089D          MOVW    #1, @(SP)+                                              ;
                        68    AE  1C  A9 D0 008A0          MOVL    28(RPTR), TPTR                                          ; 2235
                              59  68  BE D0 008A5          MOVL    @TPTR, RPTR                                             ; 2236
                                  FD5A  31 008A9 115$:       BRW     84$                                                     ; 1974
                                    58  D5 008AC 116$:       TSTL    NCANDS                                                  ; 2251
                                    03  14 008AE          BGTR    118$                                                    ;
                                  FA6E  31 008B0 117$:       BRW     37$                                                     ;
                              04    50  AE D1 008B3 118$:       CMPL    SCOPE_STATE, #4                                         ; 2252
                                    05  12 008B7          BNEQ    119$                                                    ;
                                    28  AE D5 008B9          TSTL    NEXTSETMOD                                              ;
                                    F2  12 008BC          BNEQ    117$                                                    ;
                              52 00000000'  EF D0 008BE 119$:       MOVL    CANDLST, R2                                             ; 2267
                         0A   00 00000000G  00 8F 008C5          CASEB   DBG$GB_LANGUAGE, #0, #10                                ; 2255
                0027    0016        0016        0016    008CD 120$:       .WORD   121$-120$,-                                     ;
                0016    0016        004D        0016    008D5                   121$-120$,-                                     ;
                        0016        0016        0016    008DD                   121$-120$,-                                     ;
                                                                                122$-120$,-                                     ;
                                                                                121$-120$,-                                     ;
                                                                                125$-120$,-                                     ;
                                                                                121$-120$,-                                     ;
                                                                                121$-120$,-                                     ;
                                                                                121$-120$,-                                     ;
                                                                                121$-120$,-                                     ;
                                                                                121$-120$                                       ;
                                    18  AC DD 008E3 121$:       PUSHL   ARRAY_FLAG                                              ; 2267
                                        52 DD 008E6          PUSHL   R2                                                      ;
                                        58 DD 008E8          PUSHL   NCANDS                                                  ; 2266
                                    04  AC DD 008EA          PUSHL   PATHNAME                                                ;
                        0000V   CF      04 FB 008ED          CALLS   #4, SCOPE_RULE_NORMAL                                   ;
                                        32 11 008F2          BRB     126$                                                    ;
                                    2C  AE D4 008F4 122$:       CLRL    SCPTR                                                   ; 2275
                              01    50  AE D1 008F7          CMPL    SCOPE_STATE, #1                                         ; 2276
                                        06 13 008FB          BEQL    123$                                                    ;
                              02    50  AE D1 008FD          CMPL    SCOPE_STATE, #2                                         ; 2277
                                        06 12 00901          BNEQ    124$                                                    ;
                          2C    AE  008C  CE D0 00903 123$:       MOVL    SCOPE, SCPTR                                            ; 2279
                                    2C  AE DD 00909 124$:       PUSHL   SCPTR                                                   ; 2282
                                        52 DD 0090C          PUSHL   R2                                                      ;
                                        58 DD 0090E          PUSHL   NCANDS                                                  ;
                                    04  AC DD 00910          PUSHL   PATHNAME                                                ; 2281
                        0000V   CF      04 FB 00913          CALLS   #4, SCOPE_RULE_COBOL                                    ;
                                        0C 11 00918          BRB     126$                                                    ;
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                                    52  DD 0091A 125$:  PUSHL   R2                                      ; 2290
                                    58  DD 0091C        PUSHL   NCANDS                                  ;
                                04  AC  DD 0091E        PUSHL   PATHNAME                                ;
                          0000V CF      03  FB 00921    CALLS   #3, SCOPE_RULE_PLI                      ;
                             4C AE      50  D0 00926 126$:  MOVL   R0, GOOD_CAND                       ;
                                        0F  15 0092A        BLEQ   127$                                 ; 2299
                             50     4C  AE  D0 0092C        MOVL   GOOD_CAND, R0                        ; 2302
                             30 AE 00000000'FF40  D0 00930  MOVL   @CANDLST[R0], CANDBLK                ;
                                        2D  11 00939        BRB    131$                                 ; 2301
                                        52  D4 0093B 127$:  CLRL   I                                    ; 2310
                                        0E  11 0093D        BRB    129$                                 ;
                                00000000'FF42  DD 0093F 128$:  PUSHL  @CANDLST[I]                       ;
                   00000000G    00      01  FB 00946        CALLS  #1, DBG$REL_MEMORY                   ;
                EE             52      58  F3 0094D 129$:  AOBLEQ NCANDS, I, 128$                     ;
                                        58  D4 00951        CLRL   NCANDS                               ; 2311
                   FFFFFFFF     8F     4C  AE  D1 00953    CMPL   GOOD_CAND, #-1                       ; 2318
                                        03  13 00958        BEQL   130$                                 ;
                                    F9C1  31 0095D        BRW    37$                                  ;
                                08  BC  D4 00960 130$:  CLRL   @SYMID                                  ; 2321
                             0C BC      09  D0 00963        MOVL   #9, @KIND                            ; 2322
                                        04  00967        RET                                         ; 2320
                                        5A  D4 00968 131$:  CLRL   J                                    ; 2336
                                30 BE4A  7F 0096A 132$:  PUSHAQ @CANDBLK[J]                             ; 2339
                                        59  9E  D0 0096E        MOVL   @(SP)+, RPTR                     ;
                                        51  13 00971        BEQL   133$                                 ; 2340
                                     0A     14  A9  91 00973    CMPB   20(RPTR), #10                    ; 2341
                                        4B  12 00977        BNEQ   133$                                 ;
                                        07  DD 00979        PUSHL  #7                                   ; 2342
                   00000000G    00      01  FB 0097B        CALLS  #1, DBG$GET_MEMORY                   ;
                          20    AE      50  D0 00982        MOVL   R0, RSTPTR                           ;
                          20    BE 00000000G  00  D0 00986  MOVL   RST$TEMP_LIST, @RSTPTR               ; 2343
                   00000000G    00      20  AE  D0 0098E    MOVL   RSTPTR, RST$TEMP_LIST                ; 2344
                50        20    AE      0C  C1 00996        ADDL3  #12, RSTPTR, R0                      ; 2345
                                60      0C  A9  D0 0099B    MOVL   12(RPTR), (R0)                       ;
                50        20    AE      10  C1 0099F        ADDL3  #16, RSTPTR, R0                      ; 2346
                                60      10  A9  D0 009A4    MOVL   16(RPTR), (R0)                       ;
                50        20    AE      14  C1 009A8        ADDL3  #20, RSTPTR, R0                      ; 2347
                                        60  94 009AD        CLRB   (R0)                                 ;
                50        20    AE      18  C1 009AF        ADDL3  #24, RSTPTR, R0                      ; 2348
                                60      18  A9  D0 009B4    MOVL   24(RPTR), (R0)                       ;
                                    30 BE4A  7F 009B8       PUSHAQ @CANDBLK[J]                          ; 2349
                                9E      24  AE  D0 009BC    MOVL   RSTPTR, @(SP)+                       ;
                                        5A  D6 009C0        INCL   J                                    ; 2350
                                        A6  11 009C2        BRB    132$                                 ; 2337
                                        5A  D4 009C4 133$:  CLRL   J                                    ; 2357
                                30 BE4A  7F 009C6 134$:  PUSHAQ @CANDBLK[J]                             ; 2360
                          20    AE      9E  D0 009CA        MOVL   @(SP)+, RSTPTR                       ;
                                        2B  13 009CE        BEQL   136$                                 ; 2361
                50        20    AE      14  C1 009D0        ADDL3  #20, RSTPTR, R0                      ; 2362
                                        60  95 009D5        TSTB   (R0)                                 ;
                                        22  12 009D7        BNEQ   136$                                 ;
                50        20    AE      14  C1 009D9        ADDL3  #20, RSTPTR, R0                      ; 2363
                                60      06  90 009DE        MOVB   #6, (R0)                             ;
                51        30    AE      08  C1 009E1        ADDL3  #8, CANDBLK, R1                      ; 2364
                                52      614A  7E 009E6      MOVAQ  (R1)[J], R2                          ;
                                50      62  D0 009EA        MOVL   (R2), R0                             ;
                                        08  13 009ED        BEQL   135$                                 ;
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                51      20   AE                10  C1 009EF          ADDL3   #16, RSTPTR, R1                          ; 2366
                             61                50  D0 009F4          MOVL    R0, (R1)                                 ;
                                               5A  D6 009F7 135$:    INCL    J                                        ; 2368
                                               CB  11 009F9          BRB     134$                                     ; 2358
                             53        10      AE  E9 009FB 136$:    BLBC    LINE_NUM_IS_LAST, 139$                   ; 2375
                         0090  CE        30    BE  D0 009FF          MOVL    @CANDBLK, MODRSTPTR                      ; 2378
                             50      0090  CE  D0 00A05 137$:    MOVL    MODRSTPTR, R0                            ; 2379
                             01        14  A0  91 00A0A          CMPB    20(R0), #1                               ;
                                           08  13 00A0E          BEQL    138$                                     ;
                         0090  CE        10  A0  D0 00A10          MOVL    16(R0), MODRSTPTR                        ; 2380
                                           ED  11 00A16          BRB     137$                                     ;
                                           7E  D4 00A18 138$:    CLRL    -(SP)                                    ; 2382
                                     0098  CE  9F 00A1A          PUSHAB  LINEEND                                  ;
                                     00A0  CE  9F 00A1E          PUSHAB  LINESTART                                ;
                                     009C  CE  DD 00A22          PUSHL   MODRSTPTR                                ; 2383
                                       10  AE  DD 00A26          PUSHL   STMT_NUM                                 ; 2382
                                       18  AE  DD 00A29          PUSHL   LINE_NUM                                 ;
                    00000000G  00          06  FB 00A2C          CALLS   #6, DBG$LINE_TO_PC_LOOKUP                ;
                         0084  CF          50  D0 00A33          MOVL    R0, STATUS                               ;
                                     0094  CE  DD 00A38          PUSHL   LINEEND                                  ; 2385
                                     009C  CE  DD 00A3C          PUSHL   LINESTART                                ;
                                       08  AE  DD 00A40          PUSHL   STMT_NUM                                 ;
                                       10  AE  DD 00A43          PUSHL   LINE_NUM                                 ;
                                       40  BE  DD 00A46          PUSHL   @CANDBLK                                 ; 2384
                         0000V  CF          05  FB 00A49          CALLS   #5, DBG$STA_LINE_NUM_RST                 ;
                             30  BE          50  D0 00A4E          MOVL    R0, @CANDBLK                             ;
                             20  AE        30    BE  D0 00A52 139$:    MOVL    @CANDBLK, RSTPTR                         ; 2391
        00      04  BC                    08      10  ED 00A57          CMPZV   #16, #8, @PATHNAME, #0                   ; 2398
                                                   03  12 00A5D          BNEQ    140$                                     ;
                                               00A5  31 00A5F          BRW     146$                                     ;
                                           03    60    AE  E9 00A62 140$:    BLBC    HAVE_NUM_SCOPE, 141$                     ;
                                               00A2  31 00A66          BRW     147$                                     ;
                                           52        20  AE  D0 00A69 141$:    MOVL    RSTPTR, ROUTPTR                          ; 2406
                                           02        14  A2  91 00A6D 142$:    CMPB    20(ROUTPTR), #2                          ; 2407
                                                     2D  13 00A71          BEQL    144$                                     ;
                                           01        14  A2  91 00A73          CMPB    20(ROUTPTR), #1                          ; 2409
                                                     21  12 00A77          BNEQ    143$                                     ;
                                                 009C  CE  9F 00A79          PUSHAB  PATHSTRING                               ; 2412
                                                   04  AC  DD 00A7D          PUSHL   PATHNAME                                 ;
                                 00000000G  00         02  FB 00A80          CALLS   #2, DBG$NPATHDESC_TO_CS                  ;
                                                 009C  CE  DD 00A87          PUSHL   PATHSTRING                               ; 2413
                                                   01  DD 00A8B          PUSHL   #1                                       ;
                                           00028C90      8F  DD 00A8D          PUSHL   #167056                                  ;
                                 00000000G  00         03  FB 00A93          CALLS   #3, LIB$SIGNAL                           ;
                                           52        10  A2  D0 00A9A 143$:    MOVL    16(ROUTPTR), ROUTPTR                     ; 2416
                                                     CD  11 00A9E          BRB     142$                                     ; 2407
        50      04  BC                    08          10  EF 00AA0 144$:    EXTZV   #16, #8, @PATHNAME, R0                   ; 2423
                                       08  AE      FC A740  D0 00AA6          MOVL    -4(PATHVEC)[R0], PNAME                   ;
                                                   0C  A2  DD 00AAC          PUSHL   12(ROUTPTR)                              ; 2424
                                 00000000G  00         01  FB 00AAF          CALLS   #1, DBG$GET_DST_NAME                     ;
                                           3C  AE          50  D0 00AB6          MOVL    R0, RNAME                                ;
                                           51        08  BE  9A 00ABA          MOVZBL  @PNAME, R1                               ; 2425
                                           50        3C  BE  9A 00ABE          MOVZBL  @RNAME, R0                               ;
                                     54        3C  AE          01  C1 00AC2          ADDL3   #1, RNAME, R4                    ;
                                     55        08  AE          01  C1 00AC7          ADDL3   #1, PNAME, R5                    ;
        50              00                    65              51  2D 00ACC          CMPC5   R1, (R5), #0, R0, (R4)           ;
                                                              64      00AD1                                                   ;
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                                                21  13 00AD2          BEQL    145$                                                    ;
                                          009C  CE  9F 00AD4          PUSHAB  PATHSTRING                                              ; 2428
                                            04  AC  DD 00AD8          PUSHL   PATHNAME                                                ;
                    00000000G   00              02  FB 00ADB          CALLS   #2, DBG$NPATHDESC_TO_CS                                 ;
                                          009C  CE  DD 00AE2          PUSHL   PATHSTRING                                              ; 2429
                                                01  DD 00AE6          PUSHL   #1                                                      ;
                                      00028C90  8F  DD 00AE8          PUSHL   #167056                                                 ;
                    00000000G   00              03  FB 00AEE          CALLS   #3, LIB$SIGNAL                                          ;
                50        04   AC              04  C1 00AF5 145$:     ADDL3   #4, PATHNAME, R0                                        ; 2436
                                                60  D5 00AFA          TSTL    (R0)                                                    ;
                                                41  13 00AFC          BEQL    151$                                                    ;
                52        04   AC              04  C1 00AFE          ADDL3   #4, PATHNAME, R2                                        ; 2438
                                                62  DD 00B03          PUSHL   (R2)                                                    ;
                                                0E  11 00B05          BRB     148$                                                    ;
                          14         60        AE  E9 00B07 146$:     BLBC    HAVE_NUM_SCOPE, 149$                                    ; 2447
                                    0088  CE  D5 00B0B 147$:     TSTL    NUMSCP_INVOC_NUM                                        ;
                                                0E  13 00B0F          BEQL    149$                                                    ;
                                    0088  CE  DD 00B11          PUSHL   NUMSCP_INVOC_NUM                                        ; 2449
                                      24  AE  DD 00B15 148$:     PUSHL   RSTPTR                                                  ;
                        F201    CF              02  FB 00B18          CALLS   #2, DBG$BUILD_INVOC_RST                                 ;
                                                1C  11 00B1D          BRB     150$                                                    ;
00              04  BC            08              10  ED 00B1F 149$:     CMPZV   #16, #8, @PATHNAME, #0                          ; 2456
                                                18  12 00B25          BNEQ    151$                                                    ;
01              04  BC            08              08  ED 00B27          CMPZV   #8, #8, @PATHNAME, #1                           ; 2457
                                                10  12 00B2D          BNEQ    151$                                                    ;
                                    008C  CE  DD 00B2F          PUSHL   SCOPE                                                   ; 2459
                                      24  AE  DD 00B33          PUSHL   RSTPTR                                                  ;
                        0000V   CF              02  FB 00B36          CALLS   #2, FOLLOW_STATIC_LINK                                  ;
                          20    AE              50  D0 00B3B 150$:     MOVL    R0, RSTPTR                                              ;
                          08    BC        20    AE  D0 00B3F 151$:     MOVL    RSTPTR, @SYMID                                          ; 2464
                50        20    AE              14  C1 00B44          ADDL3   #20, RSTPTR, R0                                         ; 2465
                          0C    BC              60  9A 00B49          MOVZBL  (R0), @KIND                                             ;
                                                52  D4 00B4D          CLRL    I                                                       ; 2470
                                                0E  11 00B4F          BRB     153$                                                    ;
                                00000000'FF     42  DD 00B51 152$:     PUSHL   @CANDLST[I]                                             ;
                    00000000G   00              01  FB 00B58          CALLS   #1, DBG$REL_MEMORY                                      ;
                EE        ,       52            58  F3 00B5F 153$:     AOBLEQ  NCANDS, I, T52$                                         ;
                                50  00000000G   00  D0 00B63          MOVL    RST$REF_LIST, R0                                        ; 2478
                                60        04    A0  D1 00B6A          CMPL    4(R0), (R0)                                             ;
                                                39  12 00B6E          BNEQ    154$                                                    ;
                                60              14  C0 00B70          ADDL2   #20, (R0)                                               ; 2481
                7E              60              02  C1 00B73          ADDL3   #2, (R0), -(SP)                                         ; 2482
                    00000000G   00              01  FB 00B77          CALLS   #1, DBG$GET_MEMORY                                      ;
                          70    AE              50  D0 00B7E          MOVL    R0, NEWREFLIST                                          ;
                                57  00000000G   00  D0 00B82          MOVL    RST$REF_LIST, R7                                        ; 2483
                                50        04    A7  D0 00B89          MOVL    4(R7), R0                                               ;
                                50              04  C4 00B8D          MULL2   #4, R0                                                  ;
                                50              08  C0 00B90          ADDL2   #8, R0                                                  ;
70  BE                          67              50  28 00B93          MOVC3   R0, (R7), @NEWREFLIST                                   ;
                                                57  DD 00B98          PUSHL   R7                                                      ; 2484
                    00000000G   00              01  FB 00B9A          CALLS   #1, DBG$REL_MEMORY                                      ;
                    00000000G   00        70    AE  D0 00BA1          MOVL    NEWREFLIST, RST$REF_LIST                                ; 2485
                                50  00000000G   00  D0 00BA9 154$:     MOVL    RST$REF_LIST, R0                                        ; 2488
                                              04    A0  D6 00BB0          INCL    4(R0)                                                   ;
                                51            04    A0  D0 00BB3          MOVL    4(R0), R1                                               ; 2489
                          04 A041             20    AE  D0 00BB7          MOVL    RSTPTR, 4(R0)[R1]                                       ;
                    00000000G   00        0090  CE  D1 00BBD          CMPL    MODRSTPTR, LRUM$MOST_RECENT                             ; 2495
```

```
                                    0B  13 00BC6          BEQL    155$                                    ;
                              0090  CE  DD 00BC8          PUSHL   MODRSTPTR                               ;
                                    01  FB 00BCC          CALLS   #1, DBG$RST_MOST_RECENT                 ;
                00000000G  00             04 00BD3 155$:  RET                                             ; 2498

; Routine Size:  3028 bytes,    Routine Base:  DBG$CODE + 03BB
```

```
;  2378     2499  1 GLOBAL ROUTINE DBG$STA_GETSYMOFF(ADDR, P_SYMID, P_BIT_OFFSET) =
;  2379     2500  1 !
;  2380     2501  1 ! FUNCTION:
;  2381     2502  1 !       This routine accepts a address descriptor, and attempts to symbolize
;  2382     2503  1 !       it as a symbol name plus offset.
;  2383     2504  1 !       It always returns the best possible symbolization; if the address can
;  2384     2505  1 !       be symbolized by more than one symbol name with the same offset, then
;  2385     2506  1 !       the first is chosen to be the best.
;  2386     2507  1 !
;  2387     2508  1 !       The routine accepts an optional print flag (the default being no print).
;  2388     2509  1 !       The best symbolization is returned in the form of symid and offset.  If
;  2389     2510  1 !       output is specified (as in the SYMBOLIZE command), then the following
;  2390     2511  1 !       occurs:
;  2391     2512  1 !
;  2392     2513  1 !       1.  If the address is found to be an instruction address, then the
;  2393     2514  1 !           the routines it calls symbolize it as either a label (exact match
;  2394     2515  1 !           only), or as a line number and byte offset from the start of the
;  2395     2516  1 !           line.  This information is printed, along with the routine name plus
;  2396     2517  1 !           byte offset from the beginning of the routine.
;  2397     2518  1 !
;  2398     2519  1 !       2.  If the address turns out to be a data address (that is, if it turns out
;  2399     2520  1 !           not to be in any routine's instruction address range), this routine will
;  2400     2521  1 !           see if it corresponds to any static data item.  If so, that data symbol
;  2401     2522  1 !           and an offset from it will be printed, and the symid and offset will be
;  2402     2523  1 !           returned.  Symbolization will not be done to array elements or record
;  2403     2524  1 !           components--only the outer level static data item will be returned as
;  2404     2525  1 !           as the symbol.  If the address is a stack address, then the VAX call
;  2405     2526  1 !           stack is searched for a match.  Or, if the address is a register
;  2406     2527  1 !           address, then the module's symbol table is searched for those symbols
;  2407     2528  1 !           bound to that register.  If no symbol is found at all, then the symid
;  2408     2529  1 !           is set to zero, and the absolute virtual address is returned as the
;  2409     2530  1 !           offset.  A message saying that no symbolization was possible is
;  2410     2531  1 !           is displayed, and the routine returns false.
;  2411     2532  1 !
;  2412     2533  1 !       DBG$STA_GETSYMOFF is called to symbolize addresses only in certain cir-
;  2413     2534  1 !       cumstances.  One is when the user program has faulted somewhere (with an
;  2414     2535  1 !       access violation, for example) and the fault address must be symbolized
;  2415     2536  1 !       and displayed in an understandable form.  Another is when VAX machine
;  2416     2537  1 !       instructions are displayed symbolically (through E/I or STEP, for exam-
;  2417     2538  1 !       ple) and operands must be displayed in as symbolic a form as possible.
;  2418     2539  1 !       DBG$STA_GETSYMOFF is always called during execution of the SYMBOLIZE
;  2419     2540  1 !       command, and output is always done in that case.
;  2420     2541  1 !
;  2421     2542  1 ! INPUTS:
;  2422     2543  1 !       ADDR            - The address of an address descriptor (byte and bit offset).
;  2423     2544  1 !
;  2424     2545  1 !       P_SYMID         - The address of a longword location where the "symbol identi-
;  2425     2546  1 !                         fier" should be returned.  The "symbol identifier" is a value
;  2426     2547  1 !                         which uniquely identifies the returned symbol.  This value is
;  2427     2548  1 !                         not directly understood outside the symbol table access rou-
;  2428     2549  1 !                         tines, but can be passed to various other symbol table access
;  2429     2550  1 !                         routines to extract information about the symbol.
;  2430     2551  1 !
;  2431     2552  1 !       P_BIT_OFFSET    - The address of a longword location where the bit offset from
;  2432     2553  1 !                         the SYMID symbol should be returned.
;  2433     2554  1 !
;  2434     2555  1 !       An optional print flag may be specified.  The default is FALSE - no print.
```

```
;  2435          2556  1 !
;  2436          2557  1 ! OUTPUTS:
;  2437          2558  1 !       SYMID   - A symbol identifier which uniquely identifies the symbol
;  2438          2559  1 !                 which best symbolizes ADDR is returned to SYMID.  This symbol
;  2439          2560  1 !                 identifier can then be passed to any symbol table access rou-
;  2440          2561  1 !                 tine which accepts a SYMID parameter.  If no suitable symbol
;  2441          2562  1 !                 can be found, a zero is returned to SYMID.
;  2442          2563  1 !
;  2443          2564  1 !       OFFSET  - The bit offset of ADDR relative to the SYMID symbol is
;  2444          2565  1 !                 returned to OFFSET.  If (SYMID) is zero, this
;  2445          2566  1 !                 offset is simply the original address descriptor.
;  2446          2567  1 !
;  2447          2568  1 !       The routine returns true if symbolization was possible; otherwise it
;  2448          2569  1 !       returns false.
;  2449          2570  1 !
;  2450          2571  1
;  2451          2572  2     BEGIN
;  2452          2573  2
;  2453          2574  2     BUILTIN
;  2454          2575  2         ACTUALCOUNT,
;  2455          2576  2         ACTUALPARAMETER;
;  2456          2577  2
;  2457          2578  2     BIND
;  2458          2579  2         SYMID  = .P_SYMID:  REF RST$ENTRY,
;  2459          2580  2         BIT_OFFSET = .P_BIT_OFFSET;
;  2460          2581  2
;  2461          2582  2     MAP
;  2462          2583  2         ADDR: REF DBG$ADDRESS_DESC;     ! Pointer to address descriptor
;  2463          2584  2
;  2464          2585  2     LOCAL
;  2465          2586  2         PRINT_FLAG;                     ! Flag for print/no print.
;  2466          2587  2
;  2467          2588  2
;  2468          2589  2     ! If the caller wants output, then the fourth parameter will be true.
;  2469          2590  2     ! Otherwise, the fourth parameter will be false, or not at all.
;  2470          2591  2     !
;  2471          2592  2     IF ACTUALCOUNT() GEQ 4
;  2472          2593  2     THEN
;  2473          2594  2         PRINT_FLAG = ACTUALPARAMETER (4)
;  2474          2595  2     ELSE
;  2475          2596  2         PRINT_FLAG = FALSE;
;  2476          2597  2
;  2477          2598  2
;  2478          2599  2     ! See if the address is a register address.
;  2479          2600  2     !
;  2480          2601  2     IF DBG$SYMBOLIZE_REG (.ADDR, SYMID, BIT_OFFSET, .PRINT_FLAG)
;  2481          2602  2     THEN
;  2482          2603  2         RETURN TRUE;
;  2483          2604  2
;  2484          2605  2
;  2485          2606  2     ! See if the address is a static address.
;  2486          2607  2     !
;  2487          2608  2     IF DBG$SEARCH_SAT (.ADDR, SYMID, BIT_OFFSET, .PRINT_FLAG)
;  2488          2609  2     THEN
;  2489          2610  3         BEGIN
;  2490          2611  3
;  2491          2612  3
```

```
;  2492     2613  3          ! At this point, we have found a module, but there is no symid we could
;  2493     2614  3          ! locate, so try global search to locate more info.
;  2494     2615  3          !
;  2495     2616  3          IF .SYMID EQL 0
;  2496     2617  3          THEN
;  2497     2618  4              BEGIN
;  2498     2619  4              IF .PRINT_FLAG THEN DBG$PRINT_CONTROL(DBG$K_PRT_RESET);
;  2499     2620  4              IF DBG$SEARCH_GLOBAL (.ADDR, SYMID, BIT_OFFSET, .PRINT_FLAG)
;  2500     2621  4              THEN
;  2501     2622  4                  RETURN TRUE
;  2502     2623  4
;  2503     2624  4              ELSE
;  2504     2625  5                  BEGIN
;  2505     2626  5                  BIT_OFFSET = .ADDR;
;  2506     2627  5                  RETURN FALSE;
;  2507     2628  4                  END;
;  2508     2629  4
;  2509     2630  4              END
;  2510     2631  4
;  2511     2632  4
;  2512     2633  4          ! We have found a good symid in a given module, for SYMBOLIZE command,
;  2513     2634  4          ! we print a bit more info for the symbol declared as global.  But we
;  2514     2635  4          ! do not want the global symid.
;  2515     2636  4          !
;  2516     2637  3          ELSE
;  2517     2638  4              BEGIN
;  2518     2639  4              IF .PRINT_FLAG
;  2519     2640  4              THEN
;  2520     2641  5                  BEGIN
;  2521     2642  5                  LOCAL
;  2522     2643  5                      TMP_SYMID, TMP_OFFSET;
;  2523     2644  5
;  2524     2645  5                  DBG$PRINT_CONTROL(DBG$K_PRT_RESET);
;  2525     2646  5                  DBG$SEARCH_GLOBAL (.ADDR, TMP_SYMID, TMP_OFFSET, .PRINT_FLAG);
;  2526     2647  4                  END;
;  2527     2648  4
;  2528     2649  4              RETURN TRUE;
;  2529     2650  3              END;
;  2530     2651  3
;  2531     2652  2          END;
;  2532     2653  2
;  2533     2654  2
;  2534     2655  2          ! See if the address is on the call stack.
;  2535     2656  2          !
;  2536     2657  2          IF DBG$SEARCH_VAX_CALL_STACK (.ADDR, SYMID, BIT_OFFSET, .PRINT_FLAG)
;  2537     2658  2          THEN
;  2538     2659  2              RETURN TRUE;
;  2539     2660  2
;  2540     2661  2
;  2541     2662  2          ! Try once more!!!  See if the address is a global symbol.
;  2542     2663  2          !
;  2543     2664  2          IF DBG$SEARCH_GLOBAL (.ADDR, SYMID, BIT_OFFSET, .PRINT_FLAG)
;  2544     2665  2          THEN
;  2545     2666  2              RETURN TRUE;
;  2546     2667  2
;  2547     2668  2
;  2548     2669  2          ! The address was not found, and symbolization was thus impossible.
```

```
;  2549          2670  2     !
;  2550          2671  2     SYMID = 0;
;  2551          2672  2     BIT_OFFSET = .ADDR;
;  2552          2673  2     RETURN FALSE;
;  2553          2674  1     END;


                                                00FC 00000          .ENTRY  DBG$STA_GETSYMOFF, Save R2,R3,R4,R5,R6,R7    ; 2499
                                    57 00000000G   00   9E 00002    MOVAB   DBG$PRINT_CONTROL, R7                        ;
                                    56 00000000G   00   9E 00009    MOVAB   DBG$SEARCH_GLOBAL, R6                        ;
                                    5E             08   C2 00010    SUBL2   #8, SP                                       ;
                                    54       08    AC   D0 00013    MOVL    P_SYMID, R4                                  ; 2579
                                    53       0C    AC   D0 00017    MOVL    P_BIT_OFFSET, R3                             ; 2580
                                    04             6C   91 0001B    CMPB    (AP), #4                                     ; 2592
                                                   06   1F 0001E    BLSSU   1$                                           ;
                                    55       10    AC   D0 00020    MOVL    16(AP), PRINT_FLAG                           ; 2594
                                                   02   11 00024    BRB     2$                                           ;
                                                   55   D4 00026 1$:  CLRL    PRINT_FLAG                                   ; 2596
                                                   28   BB 00028 2$:  PUSHR   #^M<R3,R5>                                  ; 2601
                                                   54   DD 0002A    PUSHL   R4                                           ;
                                    52       04    AC   D0 0002C    MOVL    ADDR, R2                                     ;
                                                   52   DD 00030    PUSHL   R2                                           ;
                        00000000G  00              04   FB 00032    CALLS   #4, DBG$SYMBOLIZE_REG                        ;
                                    55             50   E8 00039    BLBS    R0, 6$                                       ;
                                                   28   BB 0003C    PUSHR   #^M<R3,R5>                                   ; 2608
                                                   14   BB 0003E    PUSHR   #^M<R2,R4>                                   ;
                        00000000G  00              04   FB 00040    CALLS   #4, DBG$SEARCH_SAT                           ;
                                    2F             50   E9 00047    BLBC    R0, 5$                                       ;
                                                   64   D5 0004A    TSTL    (R4)                                         ; 2616
                                                   14   12 0004C    BNEQ    4$                                           ;
                                    05             55   E9 0004E    BLBC    PRINT_FLAG, 3$                               ; 2619
                                                   05   DD 00051    PUSHL   #5                                           ;
                                    67             01   FB 00053    CALLS   #1, DBG$PRINT_CONTROL                        ;
                                                   28   BB 00056 3$:  PUSHR   #^M<R3,R5>                                  ; 2620
                                                   14   BB 00058    PUSHR   #^M<R2,R4>                                   ;
                                    66             04   FB 0005A    CALLS   #4, DBG$SEARCH_GLOBAL                        ;
                                    31             50   E8 0005D    BLBS    R0, 6$                                       ;
                                                   35   11 00060    BRB     8$                                           ; 2626
                                    2C             55   E9 00062 4$:  BLBC    PRINT_FLAG, 6$                               ; 2639
                                                   05   DD 00065    PUSHL   #5                                           ; 2645
                                    67             01   FB 00067    CALLS   #1, DBG$PRINT_CONTROL                        ;
                                                   55   DD 0006A    PUSHL   PRINT_FLAG                                   ; 2646
                                          04       AE   9F 0006C    PUSHAB  TMP_OFFSET                                   ;
                                          0C       AE   9F 0006F    PUSHAB  TMP_SYMID                                    ;
                                                   52   DD 00072    PUSHL   R2                                           ;
                                    66             04   FB 00074    CALLS   #4, DBG$SEARCH_GLOBAL                        ;
                                                   18   11 00077    BRB     6$                                           ; 2649
                                                   28   BB 00079 5$:  PUSHR   #^M<R3,R5>                                  ; 2657
                                                   14   BB 0007B    PUSHR   #^M<R2,R4>                                   ;
                        00000000G  00              04   FB 0007D    CALLS   #4, DBG$SEARCH_VAX_CALL_STACK                ;
                                    0A             50   E8 00084    BLBS    R0, 6$                                       ;
                                                   28   BB 00087    PUSHR   #^M<R3,R5>                                   ; 2664
                                                   14   BB 00089    PUSHR   #^M<R2,R4>                                   ;
                                    66             04   FB 0008B    CALLS   #4, DBG$SEARCH_GLOBAL                        ;
```

```
                04   50  E9 0008E          BLBC    R0, 7$                          ;
                50   01  D0 00091 6$:      MOVL    #1, R0                          ; 2666
                         04 00094          RET                                     ;
                     64  D4 00095 7$:      CLRL    (R4)                            ; 2671
                     63  52 D0 00097 8$:    MOVL    R2, (R3)                        ; 2672
                     50  D4 0009A          CLRL    R0                              ; 2674
                         04 0009C          RET                                     ;

; Routine Size:  157 bytes,    Routine Base:  DBG$CODE + 0F8F
```

```
;  2555     2675  1 GLOBAL ROUTINE DBG$STA_LINE_NUM_RST(LEXPTR, LINE_NUM, STMT_NUM, LINESTART, LINEEND) =
;  2556     2676  1 !
;  2557     2677  1 ! FUNCTION
;  2558     2678  1 !       This routine builds a Line Number RST Entry for a specified line and
;  2559     2679  1 !       links it into the RST.  In addition to the RST entry, a dummy Label DST
;  2560     2680  1 !       Record is built (in the same memory block) to contain the line's name
;  2561     2681  1 !       as Counted ASCII (e.g. "%LINE 25.3").  The RST entry is linked into the
;  2562     2682  1 !       Temporary RST Entry List pointed to by RST$TEMP_LIST.
;  2563     2683  1 !
;  2564     2684  1 ! INPUTS
;  2565     2685  1 !       LEXPTR  - A pointer to the lexical entity RST entry to which the Line
;  2566     2686  1 !                 Number RST Entry should be attached via the up-scope pointer.
;  2567     2687  1 !
;  2568     2688  1 !       LINE_NUM - The line's line number.
;  2569     2689  1 !
;  2570     2690  1 !       STMT_NUM - The line's statement number.
;  2571     2691  1 !
;  2572     2692  1 !       LINESTART - The line's start address in virtual memory.
;  2573     2693  1 !
;  2574     2694  1 !       LINEEND - The line's end address in virtual memory.
;  2575     2695  1 !
;  2576     2696  1 ! OUTPUTS
;  2577     2697  1 !       A pointer to the line's Line Number RST Entry is returned as the
;  2578     2698  1 !                 routine's value.
;  2579     2699  1 !
;  2580     2700  1
;  2581     2701  2     BEGIN
;  2582     2702  2
;  2583     2703  2     LOCAL
;  2584     2704  2         DSTPTR: REF DST$RECORD,         ! Pointer to dummy Label DST Record
;  2585     2705  2         J,                              ! Index into the TEXT array; number of
;  2586     2706  2                                         !     characters in the line's name
;  2587     2707  2         NAMEPTR: REF VECTOR[,BYTE],     ! Pointer to DST record name vector
;  2588     2708  2         NUMBER,                         ! Used to convert the statement and line
;  2589     2709  2                                         !     numbers to ASCII
;  2590     2710  2         RSTPTR: REF RST$ENTRY,          ! Pointer to Line Number RST Entry
;  2591     2711  2         TEXT: VECTOR[40,BYTE];          ! Vector used to generate ASCII name
;  2592     2712  2
;  2593     2713  2
;  2594     2714  2
;  2595     2715  2     ! Build the line number name as an ASCII string in the TEXT vector.  Note
;  2596     2716  2     ! that the string is stored backward in this vector since we generate low-
;  2597     2717  2     ! order numeric digits before high-order ones.
;  2598     2718  2     !
;  2599     2719  2     J = 0;
;  2600     2720  2     IF .STMT_NUM NEQ 0
;  2601     2721  2     THEN
;  2602     2722  3         BEGIN
;  2603     2723  3         NUMBER = .STMT_NUM;
;  2604     2724  3         WHILE TRUE DO
;  2605     2725  4             BEGIN
;  2606     2726  4             TEXT[.J] = (.NUMBER MOD 10) + '0';
;  2607     2727  4             J = .J + 1;
;  2608     2728  4             NUMBER = .NUMBER/10;
;  2609     2729  4             IF .NUMBER EQL 0 THEN EXITLOOP;
;  2610     2730  3             END;
;  2611     2731  3
```

```
;  2612          2732  3          TEXT[.J] = '.';
;  2613          2733  3          J = .J + 1;
;  2614          2734  3          END;
;  2615          2735  2
;  2616          2736  2      NUMBER = .LINE_NUM;
;  2617          2737  2      WHILE TRUE DO
;  2618          2738  3          BEGIN
;  2619          2739  3          TEXT[.J] = (.NUMBER MOD 10) + '0';
;  2620          2740  3          J = .J + 1;
;  2621          2741  3          NUMBER = .NUMBER/10;
;  2622          2742  3          IF .NUMBER EQL 0 THEN EXITLOOP;
;  2623          2743  3          END;
;  2624          2744  2
;  2625          2745  2      J = .J + 6;
;  2626          2746  2      TEXT[.J - 1] = '%';
;  2627          2747  2      TEXT[.J - 2] = 'L';
;  2628          2748  2      TEXT[.J - 3] = 'I';
;  2629          2749  2      TEXT[.J - 4] = 'N';
;  2630          2750  2      TEXT[.J - 5] = 'E';
;  2631          2751  2      TEXT[.J - 6] = ' ';
;  2632          2752  2
;  2633          2753  2
;  2634          2754  2      ! Allocate enough space for the Line Number RST Entry and for a Label DST
;  2635          2755  2      ! record (which we will build in the same memory block).
;  2636          2756  2      !
;  2637          2757  2      RSTPTR = DBG$GET_MEMORY(RST$K_LINENTSIZ + (.J + 11)/4);
;  2638          2758  2      DSTPTR = .RSTPTR + 4*RST$K_LINENTSIZ;
;  2639          2759  2
;  2640          2760  2
;  2641          2761  2      ! Construct the dummy Label DST record for the line number.
;  2642          2762  2      !
;  2643          2763  2      DSTPTR[DST$B_LENGTH] = 7 + .J;
;  2644          2764  2      DSTPTR[DST$B_TYPE] = DST$K_LABEL;
;  2645          2765  2      DSTPTR[DST$B_VFLAGS] = 0;
;  2646          2766  2      DSTPTR[DST$L_VALUE] = .LINESTART;
;  2647          2767  2      NAMEPTR = DSTPTR[DST$B_NAME];
;  2648          2768  2      NAMEPTR[0] = .J;
;  2649          2769  2      INCR I FROM 1 TO .J DO NAMEPTR[.I] = .TEXT[.J - .I];
;  2650          2770  2
;  2651          2771  2
;  2652          2772  2      ! Then construct the Line Number RST Entry for the line.
;  2653          2773  2      !
;  2654          2774  2      RSTPTR[RST$L_DSTPTR] = .DSTPTR;
;  2655          2775  2      RSTPTR[RST$L_UPSCOPEPTR] = .LEXPTR;
;  2656          2776  2      RSTPTR[RST$B_KIND] = RST$K_LINE;
;  2657          2777  2      RSTPTR[RST$L_STARTADDR] = .LINESTART;
;  2658          2778  2      RSTPTR[RST$L_ENDADDR] = .LINEEND;
;  2659          2779  2
;  2660          2780  2
;  2661          2781  2      ! Link the RST entry into the Temporary RST Entry List.
;  2662          2782  2      !
;  2663          2783  2      RSTPTR[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  2664          2784  2      RST$TEMP_LIST = .RSTPTR;
;  2665          2785  2
;  2666          2786  2
;  2667          2787  2      ! Return to the caller with the RST entry address as the routine value.
;  2668          2788  2      !
```

```
;  2669     2789  2     RETURN .RSTPTR;
;  2670     2790  2
;  2671     2791  1     END;


                                                007C 00000          .ENTRY  DBG$STA_LINE_NUM_RST, Save R2,R3,R4,R5,R6    ; 2675
                                    56 00000000G   00   9E 00002    MOVAB   RST$TEMP_LIST, R6                            ;
                                    5E             28   C2 00009    SUBL2   #40, SP                                      ;
                                                   52   D4 0000C    CLRL    J                                            ; 2719
                                              0C   AC   D5 0000E    TSTL    STMT_NUM                                     ; 2720
                                                   1C   13 00011    BEQL    2$                                           ;
                                              0C   AC   D0 00015    MOVL    STMT_NUM, NUMBER                             ; 2723
                7E        00                  51   01   7A 00017 1$: EMUL    #1, NUMBER, #0, -(SP)                        ; 2726
                50        50                  8E   0A   7B 0001C    EDIV    #10, (SP)+, R0, R0                           ;
                      824E                    50   30   81 00021    ADDB3   #48, R0, TEXT[SP]                            ;
                                              51   0A   C6 00026    DIVL2   #10, NUMBER                                  ; 2728
                                                   EC   12 00029    BNEQ    1$                                           ; 2729
                                         824E      2E   90 0002B    MOVB    #46, TEXT[SP]                                ; 2732
                                              08   51   D0 0002F 2$: MOVL    LINE_NUM, NUMBER                             ; 2736
                7E        00                  51   01   7A 00033 3$: EMUL    #1, NUMBER, #0, -(SP)                        ; 2739
                50        50                  8E   0A   7B 00038    EDIV    #10, (SP)+, R0, R0                           ;
                      824E                    50   30   81 0003D    ADDB3   #48, R0, TEXT[SP]                            ;
                                              51   0A   C6 00042    DIVL2   #10, NUMBER                                  ; 2741
                                                   EC   12 00045    BNEQ    3$                                           ; 2742
                                              52   05   C0 00047    ADDL2   #5, J                                        ; 2745
                                         824E      25   90 0004A    MOVB    #37, TEXT-1[SP]                              ; 2746
                                    FE   AE42   4C   8F   90 0004E    MOVB    #76, TEXT-2[J]                               ; 2747
                                    FD   AE42   49   8F   90 00054    MOVB    #73, TEXT-3[J]                               ; 2748
                                    FC   AE42   4E   8F   90 0005A    MOVB    #78, TEXT-4[J]                               ; 2749
                                    FB   AE42   45   8F   90 00060    MOVB    #69, TEXT-5[J]                               ; 2750
                                    FA   AE42        20   90 00066    MOVB    #32, TEXT-6[J]                               ; 2751
                                              51   0B   A2   9E 0006B    MOVAB   11(R2), R1                                   ; 2757
                                              51        04   C6 0006F    DIVL2   #4, R1                                       ;
                                                   08   A1   9F 00072    PUSHAB  8(R1)                                        ;
                          00000000G           00        01   FB 00075    CALLS   #1, DBG$GET_MEMORY                           ;
                                              53   20   A0   9E 0007C    MOVAB   32(R0), DSTPTR                               ; 2758
                63                            52        07   81 00080    ADDB3   #7, J, (DSTPTR)                              ; 2763
                                    01        A3   BB   8F   9B 00084    MOVZBW  #187, 1(DSTPTR)                              ; 2764
                                    03        A3   10   AC   D0 00089    MOVL    LINESTART, 3(DSTPTR)                         ; 2766
                                              54   07   A3   9E 0008E    MOVAB   7(R3), NAMEPTR                               ; 2767
                                              64        52   90 00092    MOVB    J, (NAMEPTR)                                 ; 2768
                                                        55   D4 00095    CLRL    I                                            ; 2769
                                                        09   11 00097    BRB     5$                                           ;
                51                                 52        55   C3 00099 4$: SUBL3   I, J, R1                             ;
                                                   6544           6E41 90 0009D    MOVB    TEXT[R1], (I)[NAMEPTR]              ;
                F3                                 55             52   F3 000A2 5$: AOBLEQ  J, I, 4$                         ;
                                    0C        A0                  53   D0 000A6    MOVL    DSTPTR, 12(RSTPTR)                   ; 2774
                                    10        A0        04        AC   D0 000AA    MOVL    LEXPTR, 16(RSTPTR)                   ; 2775
                                    14        A0                  05   90 000AF    MOVB    #5, 20(RSTPTR)                       ; 2776
                                    18        A0        10        AC   7D 000B3    MOVQ    LINESTART, 24(RSTPTR)                ; 2777
                                              60                  66   D0 000B8    MOVL    RST$TEMP_LIST, (RSTPTR)              ; 2783
                                              66                  50   D0 000BB    MOVL    RSTPTR, RST$TEMP_LIST                ; 2784
                                                                      04 000BE    RET                                          ; 2791
```

```
; Routine Size:  191 bytes,    Routine Base:  DBG$CODE + 102C

; 2672          2792  1
```

```
;  2674          2793  1 GLOBAL ROUTINE DBG$STA_LOCK_SYMID(SYMID_LIST_PTR): NOVALUE =
;  2675          2794  1 !
;  2676          2795  1 ! FUNCTION
;  2677          2796  1 !       This routine "locks" a list of SYMIDs in the RST so that the correspond-
;  2678          2797  1 !       ing RST entries cannot be released to the free memory pool.  SYMIDs are
;  2679          2798  1 !       locked this way only when they will be saved in a Primary Descriptor or
;  2680          2799  1 !       elsewhere accross Debug commands.  SYMIDs used to represent "." (current
;  2681          2800  1 !       location) or breakpoint locations are examples of SYMIDs which must be
;  2682          2801  1 !       locked accross commands.  A locked SYMID remains locked until it is ex-
;  2683          2802  1 !       plicitly unlocked by a call to DBG$STA_UNLOCK_SYMID.
;  2684          2803  1 !
;  2685          2804  1 !       The actual locking procedure involves incrementing the Reference Count
;  2686          2805  1 !       in the SYMID's RST entry and in most RST entries directly accessible
;  2687          2806  1 !       from this RST entry.  This includes all RST entries upscope from the
;  2688          2807  1 !       present entry and all Data Type RST Entries attached to the up-scope
;  2689          2808  1 !       chain.
;  2690          2809  1 !
;  2691          2810  1 ! INPUTS
;  2692          2811  1 !       SYMID_LIST_PTR - A pointer to a linked list of Linked List Nodes, where
;  2693          2812  1 !                        each node contains a forward link and a SYMID value.  Each
;  2694          2813  1 !                        SYMID on the list is "locked" in the RST by incrementing the
;  2695          2814  1 !                        reference count of the corresponding RST entry.
;  2696          2815  1 !
;  2697          2816  1 ! OUTPUTS
;  2698          2817  1 !       NONE
;  2699          2818  1 !
;  2700          2819  1
;  2701          2820  2     BEGIN
;  2702          2821  2
;  2703          2822  2     LOCAL
;  2704          2823  2         LISTPTR: REF DBG$LINK_NODE;      ! Pointer to current linked list node
;  2705          2824  2
;  2706          2825  2
;  2707          2826  2
;  2708          2827  2     ! Loop through all the SYMIDs (i.e., RST pointers) on the linked list.
;  2709          2828  2     ! For each SYMID on the list, call ADD_TO_REF_COUNT to increment the RST
;  2710          2829  2     ! entry's reference count.
;  2711          2830  2     !
;  2712          2831  2     LISTPTR = .SYMID_LIST_PTR;
;  2713          2832  2     WHILE .LISTPTR NEQ 0 DO
;  2714          2833  3         BEGIN
;  2715          2834  3         ADD_TO_REF_COUNT(.LISTPTR[DBG$L_LINK_NODE_VALUE], +1);
;  2716          2835  3         LISTPTR = .LISTPTR[DBG$L_LINK_NODE_LINK];
;  2717          2836  2         END;
;  2718          2837  2
;  2719          2838  2     RETURN;
;  2720          2839  2
;  2721          2840  1     END;


                                0004 00000          .ENTRY  DBG$STA_LOCK_SYMID, Save R2                     ;  2793
                      52    04 AC   D0 00002          MOVL    SYMID_LIST_PTR, LISTPTR                         ;  2831
                                0F   13 00006 1$:       BEQL    2$                                          ;  2832
                                01   DD 00008          PUSHL   #1                                          ;  2834
```

```
                         04   A2  DD 0000A         PUSHL   4(LISTPTR)                                ;
                 0000V   CF       02  FB 0000D     CALLS   #2, ADD_TO_REF_COUNT                      ;
                         52       62  D0 00012     MOVL    (LISTPTR), LISTPTR                        ; 2835
                                  EF  11 00015     BRB     1$                                        ; 2832
                                      04 00017 2$: RET                                               ; 2840

; Routine Size:  24 bytes,    Routine Base:  DBG$CODE + 10EB
```

```
;  2723     2841  1 GLOBAL ROUTINE DBG$STA_LOOKUP_GBL(NAMEPTR) =
;  2724     2842  1 !
;  2725     2843  1 ! FUNCTION
;  2726     2844  1 !       This routine looks up a symbol in the Global Symbol Table (the GST)
;  2727     2845  1 !       and only in the GST.  It accepts the symbol name as input, looks up
;  2728     2846  1 !       that symbol in the GST, and returns a pointer to an RST entry for the
;  2729     2847  1 !       global symbol.  If the symbol is not found in the GST, a value of zero
;  2730     2848  1 !       is returned.
;  2731     2849  1 !
;  2732     2850  1 !       The whole RST and GST search is suppressed if the DBG$GB_NO_GLOBALS
;  2733     2851  1 !       flag is set.  In this case, the routine always returns zero.
;  2734     2852  1 !
;  2735     2853  1 ! INPUTS
;  2736     2854  1 !       NAMEPTR - A pointed to the symbol name to be looked up in the GST.
;  2737     2855  1 !                 The name must be represented by a Counted ASCII string.
;  2738     2856  1 !
;  2739     2857  1 ! OUTPUTS
;  2740     2858  1 !       A pointer to an RST entry for the global symbol is returned as the
;  2741     2859  1 !                 routine value.  If the symbol is not in the GST, zero is
;  2742     2860  1 !                 returned as the routine value.
;  2743     2861  1 !
;  2744     2862  1
;  2745     2863  2     BEGIN
;  2746     2864  2
;  2747     2865  2     MAP
;  2748     2866  2         NAMEPTR: REF VECTOR[,BYTE];     ! Pointer to Counted ASCII symbol name
;  2749     2867  2
;  2750     2868  2
;  2751     2869  2     LOCAL
;  2752     2870  2         RSTPTR: REF RST$ENTRY;          ! Pointer to current symbol's RST entry
;  2753     2871  2                                         !       symbol is a routine entry point
;  2754     2872  2
;  2755     2873  2
;  2756     2874  2
;  2757     2875  2     ! If the Global Symbol Table is suppressed, return zero right away.
;  2758     2876  2     !
;  2759     2877  2     IF .DBG$GB_NO_GLOBALS THEN RETURN 0;
;  2760     2878  2
;  2761     2879  2
;  2762     2880  2     ! Search the RST Hash Table for a symbol with the desired name which is
;  2763     2881  2     ! also marked as being global (meaning that it is derived from the GST).
;  2764     2882  2     ! If we find such an RST entry, we return its address to the caller.
;  2765     2883  2     !
;  2766     2884  2     DBG$HASH_FIND_SETUP(.NAMEPTR);
;  2767     2885  2     WHILE TRUE DO
;  2768     2886  3         BEGIN
;  2769     2887  3         RSTPTR = DBG$HASH_FIND(.NAMEPTR);
;  2770     2888  3         IF .RSTPTR EQL 0 THEN EXITLOOP;
;  2771     2889  3         IF .RSTPTR[RST$V_GLOBAL] THEN RETURN .RSTPTR;
;  2772     2890  2         END;
;  2773     2891  2
;  2774     2892  2
;  2775     2893  2     ! We did not find the symbol in the Global Symbol Table--just return zero.
;  2776     2894  2     !
;  2777     2895  2     RETURN 0;
;  2778     2896  2
;  2779     2897  1     END;
```

```
                                    0000 00000          .ENTRY  DBG$STA_LOOKUP_GBL, Save nothing                ; 2841
                              1D 00000000G  00   E8 00002       BLBS    DBG$GB_NO_GLOBALS, 2$                   ; 2877
                                        04  AC   DD 00009       PUSHL   NAMEPTR                                 ; 2884
                    00000000G   00          01   FB 0000C       CALLS   #1, DBG$HASH_FIND_SETUP                 ;
                                        04  AC   DD 00013 1$:    PUSHL   NAMEPTR                                 ; 2887
                    00000000G   00          01   FB 00016       CALLS   #1, DBG$HASH_FIND                       ;
                                            50   D5 0001D       TSTL    RSTPTR                                  ; 2888
                                            05   13 0001F       BEQL    2$                                      ;
                                    EE      15   A0 E9 00021   BLBC    21(RSTPTR), 1$                          ; 2889
                                                 04 00025       RET                                             ;
                                            50   D4 00026 2$:    CLRL    R0                                      ; 2897
                                                 04 00028       RET                                             ;

; Routine Size:  41 bytes,    Routine Base:  DBG$CODE + 1103
```

```
;  2781          2898  1 GLOBAL ROUTINE DBG$STA_NOEVALBIT(SYMID) =
;  2782          2899  1 !
;  2783          2900  1 !  FUNCTION
;  2784          2901  1 !        This routine determines whether the DST$V_MS_NOEVAL bit is set in the
;  2785          2902  1 !        Value Spec for a specified symbol.  This bit is used by PL/I to suppress
;  2786          2903  1 !        re-evaluation of Value Specs when such Value Specs can have side effects
;  2787          2904  1 !        (as is the case for certain kinds of BASED variables).  The side effects
;  2788          2905  1 !        are acceptable when such a symbol is initially examined, but not when
;  2789          2906  1 !        the symbol is reexamined via the dot pseudosymbol.  Thus, when dot is
;  2790          2907  1 !        bound to a symbol with the DST$V_MS_NOEVAL bit set in its Value Spec,
;  2791          2908  1 !        that Value Spec is not reevaluated.  The PL/I-specific code makes this
;  2792          2909  1 !        check, but this routine returns the value of the bit.
;  2793          2910  1 !
;  2794          2911  1 !        The DST$V_MS_NOEVAL bit can only occur in a Value Spec containing a
;  2795          2912  1 !        Materialization Spec.  If the Value Spec does not have that form, this
;  2796          2913  1 !        routine always returns FALSE--the bit is treated as not set.
;  2797          2914  1 !
;  2798          2915  1 !  INPUTS
;  2799          2916  1 !        SYMID   - The SYMID of the symbol whose DST$V_MS_NOEVAL bit is to be
;  2800          2917  1 !                  interrogated.
;  2801          2918  1 !
;  2802          2919  1 !  OUTPUTS
;  2803          2920  1 !        The routine returns TRUE if the DST$V_MS_NOEVAL bit is set in the
;  2804          2921  1 !                  symbol's value spec.  If the bit is not set or if the bit
;  2805          2922  1 !                  is not present at all in the symbol's value spec, FALSE
;  2806          2923  1 !                  is returned.
;  2807          2924  1 !
;  2808          2925  1
;  2809          2926  2     BEGIN
;  2810          2927  2
;  2811          2928  2     MAP
;  2812          2929  2         SYMID: REF RST$ENTRY;           ! Pointer to input symbol's RST entry
;  2813          2930  2
;  2814          2931  2     LOCAL
;  2815          2932  2         DSTPTR: REF DST$RECORD,         ! Pointer to symbol's DST record.
;  2816          2933  2         MSPTR: REF DST$MATER_SPEC,      ! Pointer to DST Materialization Spec
;  2817          2934  2         VSPTR: REF DST$VAL_SPEC;        ! Pointer to DST Value Spec
;  2818          2935  2
;  2819          2936  2
;  2820          2937  2
;  2821          2938  2     ! Determine what kind of RST entry SYMID identifies and act accordingly.
;  2822          2939  2     !
;  2823          2940  2     CASE .SYMID[RST$B_KIND] FROM RST$K_KIND_MINIMUM TO RST$K_KIND_MAXIMUM OF
;  2824          2941  2         SET
;  2825          2942  2
;  2826          2943  2
;  2827          2944  2         ! For anything but Data and Type Component symbols, return FALSE.  These
;  2828          2945  2         ! symbols do not have value specs containing a DST$V_MS_NOEVAL bit.
;  2829          2946  2         !
;  2830          2947  2         [RST$K_ROUTINE, RST$K_BLOCK,
;  2831          2948  2          RST$K_ENTRY, RST$K_LABEL,
;  2832          2949  2          RST$K_LINE, RST$K_TYPE]:
;  2833          2950  2             RETURN FALSE;
;  2834          2951  2
;  2835          2952  2
;  2836          2953  2         ! For Data and Type Components, do nothing here--we handle them below.
;  2837          2954  2         !
```

```
;  2838          2955  2          [RST$K_DATA, RST$K_TYPCOMP]:
;  2839          2956  2              0;
;  2840          2957  2
;  2841          2958  2
;  2842          2959  2          ! For everything else (including Module), signal an internal error.
;  2843          2960  2          !
;  2844          2961  2          [INRANGE, OUTRANGE]:
;  2845          2962  2              $DBG_ERROR('RSTACCESS\NOEVALBIT');
;  2846          2963  2
;  2847          2964  2          TES;
;  2848          2965  2
;  2849          2966  2
;  2850          2967  2      ! For the items not yet handled (i.e., for data), we determine the type of
;  2851          2968  2      ! DST record which holds the value specification and act accordingly.
;  2852          2969  2      !
;  2853          2970  2      DSTPTR = .SYMID[RST$L_DSTPTR];
;  2854          2971  2      CASE .DSTPTR[DST$B_TYPE] FROM 0 TO 255 OF
;  2855          2972  2          SET
;  2856          2973  2
;  2857          2974  2
;  2858          2975  2          ! Handle the DST records which can conceivably have Materialization
;  2859          2976  2          ! Specs and thus the DST$V_MS_NOEVAL bit.  If the bit exists, return
;  2860          2977  2          ! its value; otherwise return FALSE.
;  2861          2978  2          !
;  2862          2979  2          [DSC$K_DTYPE_LOWEST TO DSC$K_DTYPE_HIGHEST,
;  2863          2980  2           DST$K_BOOL, DST$K_SEPTYP, DST$K_LBLORLIT,
;  2864          2981  2           DST$K_RECBEG, DST$K_ENUMELT]:
;  2865          2982  3              BEGIN
;  2866          2983  3
;  2867          2984  3
;  2868          2985  3              ! Indirect through any Trailing Value Specs to get to the symbol's
;  2869          2986  3              ! Value Spec.  If this Value Spec cannot have a Materialization
;  2870          2987  3              ! Spec, return FALSE right away.
;  2871          2988  3              !
;  2872          2989  3              VSPTR = DSTPTR[DST$B_VFLAGS];
;  2873          2990  3              WHILE .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_TVS DO
;  2874          2991  3                  VSPTR = VSPTR[DST$A_VS_TVS_BASE] + .VSPTR[DST$L_VS_TVS_OFFSET];
;  2875          2992  3
;  2876          2993  3              IF .VSPTR[DST$B_VS_VFLAGS] NEQ DST$K_VS_FOLLOWS THEN RETURN FALSE;
;  2877          2994  3
;  2878          2995  3
;  2879          2996  3              ! If this is a Static or Dynamic DST$K_VS_FOLLOWS type Value Spec,
;  2880          2997  3              ! return the DST$V_MS_NOEVAL bit from the Materialization Spec.
;  2881          2998  3              !
;  2882          2999  3              IF (.VSPTR[DST$B_VS_ALLOC] EQL DST$K_VS_ALLOC_STAT) OR
;  2883          3000  4                 (.VSPTR[DST$B_VS_ALLOC] EQL DST$K_VS_ALLOC_DYN)
;  2884          3001  3              THEN
;  2885          3002  4                  BEGIN
;  2886          3003  4                  MSPTR = VSPTR[DST$A_VS_MATSPEC];
;  2887          3004  4                  RETURN .MSPTR[DST$V_MS_NOEVAL];
;  2888          3005  3                  END;
;  2889          3006  3
;  2890          3007  3
;  2891          3008  3              ! Any other value in the DST$B_VS_ALLOC field is an error.
;  2892          3009  3              !
;  2893          3010  3              SIGNAL(DBG$_INVDSTREC);
;  2894          3011  3
```

```
;  2895          3012  2              END;
;  2896          3013  2
;  2897          3014  2
;  2898          3015  2          ! For all DST records which cannot have Materialization Specs in their
;  2899          3016  2          ! Value Specs, fall through to return FALSE at the end of the routine.
;  2900          3017  2          !
;  2901          3018  2          [INRANGE]:
;  2902          3019  2              0;
;  2903          3020  2
;  2904          3021  2          TES;
;  2905          3022  2
;  2906          3023  2
;  2907          3024  2      ! Return FALSE.  If we got here, there is no Materialization Spec.
;  2908          3025  2      !
;  2909          3026  2      RETURN FALSE;
;  2910          3027  2
;  2911          3028  1      END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

56 45 4F 4E 5C 53 53 45 43 43 41 54 53 52 13  000AC P.AAQ:   .ASCII  <19>\RSTACCESS\<92>\NOEVALBIT\                ;
                                  54 49 42 4C 41  000BB                                                         ;


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                        000C 00000              .ENTRY  DBG$STA NOEVALBIT, Save R2,R3               ; 2898
                     53 00000000G   00  9E 00002              MOVAB   LIB$SIGNAL, R3                              ;
                     52         04  AC  D0 00009              MOVL    SYMID, R2                                   ; 2940
                   0D           00  14  A2  8F 0000D          CASEB   20(R2), #0, #13                             ;
0270             0270           001C       001C  00012 1$:   .WORD   2$-1$,-                                     ;
0270             002D           0270       0270  0001A                2$-1$,-                                     ;
001C             002D           001C       0270  00022                10$-1$,-                                    ;
                                001C       001C  0002A                10$-1$,-                                    ;
                                                                      10$-1$,-                                    ;
                                                                      10$-1$,-                                    ;
                                                                      3$-1$,-                                     ;
                                                                      10$-1$,-                                    ;
                                                                      10$-1$,-                                    ;
                                                                      2$-1$,-                                     ;
                                                                      3$-1$,-                                     ;
                                                                      2$-1$,-                                     ;
                                                                      2$-1$,-                                     ;
                                                                      2$-1$                                       ;
                     00000000'  EF  9F 0002E 2$:       PUSHAB  P.AAQ                                           ; 2962
                                01  DD 00034              PUSHL   #1                                              ;
                     00028362   8F  DD 00036              PUSHL   #164706                                         ;
                     63         03  FB 0003C              CALLS   #3, LIB$SIGNAL                                  ;
                     50         0C  A2  D0 0003F 3$:      MOVL    12(R2), DSTPTR                                  ; 2970
                FF 8F           00  01  A0  8F 00043      CASEB   1(DSTPTR), #0, #255                             ; 2971
0200             0200           0200       0239  00049 4$:   .WORD   10$-4$,-                                     ;
0200             0200           0200       0200  00051                5$-4$,-                                     ;
0200             0200           0200       0200  00059                5$-4$,-                                     ;
0200             0200           0200       0200  00061                5$-4$,-                                     ;
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0200    0200    0200    0200    00069           5$-4$,-
0200    0200    0200    0200    00071           5$-4$,-
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0239    0239    0200    0200    00091           5$-4$,-
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0239    0239    0239    0239    00179           10$-4$,-
0239    0200    0239    0239    00181           10$-4$,-
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0239    0239    0239    0200    00191           10$-4$,-
0200    0239    0239    0239    00199           10$-4$,-
0239    0239    0239    0239    001A1           10$-4$,-
0239    0239    0239    0239    001A9           10$-4$,-
0239    0239    0239    0239    001B1           10$-4$,-
0239    0200    0239    0239    001B9           10$-4$,-
0239    0239    0239    0239    001C1           10$-4$,-
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0239    0239    0239    0239    00211           10$-4$,-
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0239    0239    0239    0239    00221           10$-4$,-
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        0239        0239        0239        0239    00231           10$-4$,-                              ;
        0239        0239        0239        0239    00239           10$-4$,-                              ;
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                                                        10$-4$,-                        ;
                                                        10$-4$                          ;
                 50          02  C0 00249 5$:   ADDL2   #2, VSPTR                       ; 2989
           FB    8F          60  91 0024C 6$:   CMPB    (VSPTR), #251                   ; 2990
                             0B  12 00250       BNEQ    7$                              ;
         51      50     01   A0  C1 00252       ADDL3   1(VSPTR), VSPTR, R1             ; 2991
                 50     05   A1  9E 00257       MOVAB   5(R1), VSPTR                    ;
                             EF  11 0025B       BRB     6$                              ;
           FD    8F          60  91 0025D 7$:   CMPB    (VSPTR), #253                   ; 2993
                             1F  12 00261       BNEQ    10$                             ;
                 01     03   A0  91 00263       CMPB    3(VSPTR), #1                    ; 2999
                             06  13 00267       BEQL    8$                              ;
                 02     03   A0  91 00269       CMPB    3(VSPTR), #2                    ; 3000
                             0A  12 0026D       BNEQ    9$                              ;
                 50          04  C0 0026F 8$:   ADDL2   #4, MSPTR                       ; 3003
 50      02      A0  01      00  EF 00272       EXTZV   #0, #1, 2(MSPTR), R0            ; 3004
                             04     00278       RET                                     ;
              0002832A  8F   DD 00279 9$:       PUSHL   #164650                         ; 3010
                 63          01  FB 0027F       CALLS   #1, LIB$SIGNAL                  ;
                             50  D4 00282 10$:  CLRL    R0                              ; 3028
                             04     00284       RET                                     ;

; Routine Size:  645 bytes,    Routine Base:  DBG$CODE + 112C
```

```
;  2913     3029  1 GLOBAL ROUTINE DBG$STA_NUMBERED_SCOPE(SCOPE_NUMBER, MODRSTPTR, SCOPE,
;  2914     3030  1                                                 INVOCNUM): NOVALUE =
;  2915     3031  1 !
;  2916     3032  1 ! FUNCTION
;  2917     3033  1 !       This routine determines what scope corresponds to a given "numbered"
;  2918     3034  1 !       scope at this point in the user program's execution.  This scope is de-
;  2919     3035  1 !       termined by looking SCOPE_NUMBER levels down in the VAX CALL-stack and
;  2920     3036  1 !       picking up the PC value in that call frame.  The Program Static Address
;  2921     3037  1 !       Table (SAT) is searched for this PC value to find the containing module,
;  2922     3038  1 !       and after that the module's SAT is searched if the module is marked as
;  2923     3039  1 !       SET.  The module's RST is built if not already present.  The search is
;  2924     3040  1 !       successful if a Routine RST Entry or a Lexical Block RST Entry is found
;  2925     3041  1 !       whose address range contains the PC value.
;  2926     3042  1 !
;  2927     3043  1 ! INPUTS
;  2928     3044  1 !       SCOPE_NUMBER - The number of the "numbered scope" to be located.  This
;  2929     3045  1 !                      number is zero for the current scope, i.e. the scope where
;  2930     3046  1 !                      the PC is located at present, and it is N for the scope which
;  2931     3047  1 !                      contains the PC N levels down in the VAX CALL-stack.
;  2932     3048  1 !
;  2933     3049  1 !       MODRSTPTR - The address of a longword location to receive a pointer to
;  2934     3050  1 !                   the Module RST Entry for the numbered scope.
;  2935     3051  1 !
;  2936     3052  1 !       SCOPE     - The address of a longword location to receive a pointer to the
;  2937     3053  1 !                   Routine or Lexical Block RST Entry which defines the numbered
;  2938     3054  1 !                   scope.
;  2939     3055  1 !
;  2940     3056  1 !       INVOCNUM - The address of a longword location to receive the correspond-
;  2941     3057  1 !                  ing invocation number.
;  2942     3058  1 !
;  2943     3059  1 ! OUTPUTS
;  2944     3060  1 !       MODRSTPTR - A pointer to the numbered scope's Module RST Entry is
;  2945     3061  1 !                   returned to MODRSTPTR.  If the scope cannot be found, a
;  2946     3062  1 !                   zero is returned to MODRSTPTR.
;  2947     3063  1 !
;  2948     3064  1 !       SCOPE     - A pointer to the RST entry of the routine or lexical block
;  2949     3065  1 !                   which constitutes the numbered scope is returned to SCOPE.
;  2950     3066  1 !                   If the scope cannot be found, a zero is returned to SCOPE.
;  2951     3067  1 !
;  2952     3068  1 !       INVOCNUM - The invocation number of the scope is returned to INVOCNUM.
;  2953     3069  1 !
;  2954     3070  1 !       No value is returned.
;  2955     3071  1 !
;  2956     3072  1
;  2957     3073  2     BEGIN
;  2958     3074  2
;  2959     3075  2     MAP
;  2960     3076  2         MODRSTPTR: REF VECTOR[1],       ! Pointer to longword to receive the
;  2961     3077  2                                         !     Module RST Entry pointer
;  2962     3078  2         SCOPE: REF VECTOR[1],           ! Pointer to longword to receive the
;  2963     3079  2                                         !     numbered scope RST pointer
;  2964     3080  2         INVOCNUM: REF VECTOR[1];        ! Pointer to longword to receive the
;  2965     3081  2                                         !     scope's invocation number
;  2966     3082  2
;  2967     3083  2     LOCAL
;  2968     3084  2         FRAMEPTR: REF BLOCK[,BYTE],     ! Pointer to stack CALL frames
;  2969     3085  2         MODPTR: REF RST$ENTRY,          ! Pointer to scope's Module RST Entry
```

```
;  2970          3086  2          PCVAL,                          ! The CALL-frame Program Counter value
;  2971          3087  2          REGPTR: REF VECTOR[,LONG],      ! Pointer to an actual register value
;  2972          3088  2          REGVEC: VECTOR[17,LONG],        ! Vector of pointers to register save
;  2973          3089  2                                          !       locations for current CALL frame
;  2974          3090  2          ROUTPTR: REF RST$ENTRY,         ! Pointer to RST entry for inner-most
;  2975          3091  2                                          !       routine in up-scope chain
;  2976          3092  2          RPTR: REF RST$ENTRY,            ! Pointer used to search up-scope chain
;  2977          3093  2          RSTPTR: REF RST$ENTRY,          ! Pointer to numbered scope's RST entry
;  2978          3094  2          RUNFRAME_PTR,                   ! Pointer to current entry in CALL com-
;  2979          3095  2                                          !       mand runframe stack (needed by
;  2980          3096  2                                          !       the GET_REGISTER_VALUES routine)
;  2981          3097  2          SATPTR: REF SAT$ENTRY;          ! Pointer to the current Static Address
;  2982          3098  2                                          !       Table entry
;  2983          3099  2
;  2984          3100  2
;  2985          3101  2
;  2986          3102  2      ! Return zeroes (no find) to MODRSTPTR and SCOPE initially.
;  2987          3103  2      !
;  2988          3104  2      MODRSTPTR[0] = 0;
;  2989          3105  2      SCOPE[0] = 0;
;  2990          3106  2
;  2991          3107  2
;  2992          3108  2      ! Pick up the current Program Counter value from the user's run frame.
;  2993          3109  2      ! Then search through the CALL frames on the stack until the desired run
;  2994          3110  2      ! frame (and thus PC value) is reached.  If the CALL stack ends before
;  2995          3111  2      ! then, return with MODRSTPTR and SCOPE containing zeroes.
;  2996          3112  2      !
;  2997          3113  2      PCVAL = .DBG$RUNFRAME[DBG$L_USER_PC];
;  2998          3114  2      IF .PCVAL EQL 0 THEN RETURN;
;  2999          3115  2      FRAMEPTR = .DBG$RUNFRAME[DBG$L_USER_FP];
;  3000          3116  2      RUNFRAME_PTR = .DBG$RUNFRAME[DBG$L_NEXT_LINK];
;  3001          3117  2      INCR I FROM 1 TO .SCOPE_NUMBER DO
;  3002          3118  3          BEGIN
;  3003          3119  4          IF (.FRAMEPTR[SF$A_HANDLER] EQL DBG$FINAL_HANDL) OR (.PCVAL EQL 0)
;  3004          3120  4          THEN
;  3005          3121  4              RETURN;
;  3006          3122  4
;  3007          3123  4          GET_REGISTER_VALUES(.FRAMEPTR, RUNFRAME_PTR, REGVEC);
;  3008          3124  4          REGPTR = .REGVEC[15];
;  3009          3125  4          PCVAL = .REGPTR[0];
;  3010          3126  4          REGPTR = .REGVEC[13];
;  3011          3127  4          FRAMEPTR = .REGPTR[0];
;  3012          3128  4          END;
;  3013          3129  2
;  3014          3130  2
;  3015          3131  2      ! Search the Program Static Address Table (SAT) for the module which con-
;  3016          3132  2      ! tains the PC value we found.  If we don't find such a module, return
;  3017          3133  2      ! with MODRSTPTR and SCOPE containing zeroes.
;  3018          3134  2      !
;  3019          3135  2      SATPTR = .SAT$START_ADDR;
;  3020          3136  2      WHILE TRUE DO
;  3021          3137  3          BEGIN
;  3022          3138  3          IF .SATPTR EQL 0 THEN RETURN;
;  3023          3139  3          IF .PCVAL GEQ .SATPTR[SAT$L_START] AND .PCVAL LEQ .SATPTR[SAT$L_END]
;  3024          3140  3          THEN
;  3025          3141  3              EXITLOOP;
;  3026          3142  3
```

```
;  3027     3143  3          SATPTR = .SATPTR[SAT$L_FLINK];
;  3028     3144  2          END;
;  3029     3145  2
;  3030     3146  2
;  3031     3147  2      ! We found the module.  If the module is SET, search its SAT chain for the
;  3032     3148  2      ! inner-most lexical entity containing the PC value.
;  3033     3149  2      !
;  3034     3150  2      MODPTR = .SATPTR[SAT$L_RSTPTR];
;  3035     3151  2      IF NOT .MODPTR[RST$V_MODSET] THEN RETURN;
;  3036     3152  2      IF NOT .MODPTR[RST$V_MOD_IN_RST]
;  3037     3153  2      THEN
;  3038     3154  2          DBG$RST_BUILD(.MODPTR, FALSE);
;  3039     3155  2      RSTPTR = 0;
;  3040     3156  2      SATPTR = .MODPTR[RST$L_SAT_PTR];
;  3041     3157  2      WHILE TRUE DO
;  3042     3158  3          BEGIN
;  3043     3159  3          IF .SATPTR EQL 0 THEN EXITLOOP;
;  3044     3160  3          IF .SATPTR[SAT$L_START] GTR .PCVAL THEN EXITLOOP;
;  3045     3161  3          IF .SATPTR[SAT$L_END] GEQ .PCVAL
;  3046     3162  3          THEN
;  3047     3163  4              BEGIN
;  3048     3164  4              RPTR = .SATPTR[SAT$L_RSTPTR];
;  3049     3165  4
;  3050     3166  4
;  3051     3167  4              ! If this static item is not a routine or block, ignore it.
;  3052     3168  4              !
;  3053     3169  4              IF (.RPTR[RST$B_KIND] NEQ RST$K_ROUTINE) AND
;  3054     3170  5                 (.RPTR[RST$B_KIND] NEQ RST$K_BLOCK)
;  3055     3171  4              THEN
;  3056     3172  4                  0
;  3057     3173  4
;  3058     3174  4
;  3059     3175  4              ! It is a lexical entity.  If it is the first one we have found,
;  3060     3176  4              ! save its RST pointer in RSTPTR.
;  3061     3177  4              !
;  3062     3178  4              ELSE IF .RSTPTR EQL 0
;  3063     3179  4              THEN
;  3064     3180  4                  RSTPTR = .SATPTR[SAT$L_RSTPTR]
;  3065     3181  4
;  3066     3182  4
;  3067     3183  4              ! Otherwise, make sure it is the inner-most lexical entity so far.
;  3068     3184  4              ! If not, ignore it.
;  3069     3185  4              !
;  3070     3186  4              ELSE
;  3071     3187  5                  BEGIN
;  3072     3188  5                  WHILE .RPTR[RST$B_KIND] NEQ RST$K_MODULE DO
;  3073     3189  6                      BEGIN
;  3074     3190  6                      IF .RPTR EQL .RSTPTR
;  3075     3191  6                      THEN
;  3076     3192  7                          BEGIN
;  3077     3193  7                          RSTPTR = .SATPTR[SAT$L_RSTPTR];
;  3078     3194  7                          EXITLOOP;
;  3079     3195  6                          END;
;  3080     3196  6
;  3081     3197  6                      RPTR = .RPTR[RST$L_UPSCOPEPTR];
;  3082     3198  5                      END;
;  3083     3199  5
```

```
;  3084          3200  4                 END;
;  3085          3201  4
;  3086          3202  3             END;
;  3087          3203  3
;  3088          3204  3         SATPTR = .SATPTR[SAT$L_FLINK];
;  3089          3205  2         END;
;  3090          3206  2
;  3091          3207  2
;  3092          3208  2     ! If we did not find the containing lexical entity, return with MODRSTPTR
;  3093          3209  2     ! and SCOPE containing zeroes.
;  3094          3210  2     !
;  3095          3211  2     IF .RSTPTR EQL 0 THEN RETURN;
;  3096          3212  2
;  3097          3213  2
;  3098          3214  2     ! We found the scope successfully.  Return the proper RST pointers to
;  3099          3215  2     ! MODRSTPTR and SCOPE.
;  3100          3216  2     !
;  3101          3217  2     MODRSTPTR[0] = .MODPTR;
;  3102          3218  2     SCOPE[0] = .RSTPTR;
;  3103          3219  2
;  3104          3220  2
;  3105          3221  2     ! Now search the CALL stack again to determine what the invocation number is
;  3106          3222  2     ! for the routine which constitutes or immediately contains the scope.
;  3107          3223  2     !
;  3108          3224  2     INVOCNUM[0] = 0;
;  3109          3225  2     ROUTPTR = .RSTPTR;
;  3110          3226  2     WHILE .ROUTPTR[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  3111          3227  3         BEGIN
;  3112          3228  3         IF .ROUTPTR[RST$B_KIND] EQL RST$K_MODULE THEN RETURN;
;  3113          3229  3         ROUTPTR = .ROUTPTR[RST$L_UPSCOPEPTR];
;  3114          3230  3         END;
;  3115          3231  2
;  3116          3232  2     PCVAL = .DBG$RUNFRAME[DBG$L_USER_PC];
;  3117          3233  2     FRAMEPTR = .DBG$RUNFRAME[DBG$L_USER_FP];
;  3118          3234  2     RUNFRAME_PTR = .DBG$RUNFRAME[DBG$L_NEXT_LINK];
;  3119          3235  2     INCR I FROM 1 TO .SCOPE_NUMBER DO
;  3120          3236  3         BEGIN
;  3121          3237  3         IF (.PCVAL GEQ .ROUTPTR[RST$L_STARTADDR]) AND
;  3122          3238  4            (.PCVAL LEQ .ROUTPTR[RST$L_ENDADDR])
;  3123          3239  3         THEN
;  3124          3240  3             INVOCNUM[0] = .INVOCNUM[0] + 1;
;  3125          3241  3
;  3126          3242  3         GET_REGISTER_VALUES(.FRAMEPTR, RUNFRAME_PTR, REGVEC);
;  3127          3243  3         REGPTR = .REGVEC[15];
;  3128          3244  3         PCVAL = .REGPTR[0];
;  3129          3245  3         REGPTR = .REGVEC[13];
;  3130          3246  3         FRAMEPTR = .REGPTR[0];
;  3131          3247  2         END;
;  3132          3248  2
;  3133          3249  2
;  3134          3250  2     ! We are all done.  Now return.
;  3135          3251  2     !
;  3136          3252  2     RETURN;
;  3137          3253  2
;  3138          3254  1     END;
```

```
                                 00FC 00000          .ENTRY  DBG$STA_NUMBERED_SCOPE, Save R2,R3,R4,R5,-      ; 3029
                                                             R6,R7                                           ;
                    57 00000000G 00   9E 00002       MOVAB   DBG$RUNFRAME+64, R7                             ;
                    5E       B8   AE   9E 00009       MOVAB   -72(SP), SP                                     ;
                             08   BC   D4 0000D       CLRL    @MODRSTPTR                                      ; 3104
                             0C   BC   D4 00010       CLRL    @SCOPE                                          ; 3105
                    54            67   D0 00013       MOVL    DBG$RUNFRAME+64, PCVAL                          ; 3113
                                  43   13 00016       BEQL    3$                                              ; 3114
                    56       F8   A7   D0 00018       MOVL    DBG$RUNFRAME+56, FRAMEPTR                       ; 3115
                    6E       C0   A7   D0 0001C       MOVL    DBG$RUNFRAME, RUNFRAME_PTR                      ; 3116
                                  52   D4 00020       CLRL    I                                               ; 3117
                                  2B   11 00022       BRB     2$                                              ;
                    50 00000000G 00   9E 00024 1$:    MOVAB   DBG$FINAL_HANDL, R0                             ; 3119
                    50            66   D1 00028       CMPL    (FRAMEPTR), R0                                  ;
                                  2B   13 0002E       BEQL    3$                                              ;
                                  54   D5 00030       TSTL    PCVAL                                           ;
                                  27   13 00032       BEQL    3$                                              ;
                             04   AE   9F 00034       PUSHAB  REGVEC                                          ; 3123
                             04   AE   9F 00037       PUSHAB  RUNFRAME_PTR                                    ;
                                  56   DD 0003A       PUSHL   FRAMEPTR                                        ;
              0000V         CF        03   FB 0003C       CALLS   #3, GET_REGISTER_VALUES                     ;
                    55       40   AE   D0 00041       MOVL    REGVEC+80, REGPTR                               ; 3124
                    54            65   D0 00045       MOVL    (REGPTR), PCVAL                                 ; 3125
                    55       38   AE   D0 00048       MOVL    REGVEC+52, REGPTR                               ; 3126
                    56            65   D0 0004C       MOVL    (REGPTR), FRAMEPTR                              ; 3127
          D0        52       04   AC   F3 0004F 2$:    AOBLEQ  SCOPE_NUMBER, I, 1$                             ; 3117
                    52 00000000G 00   D0 00054       MOVL    SAT$START_ADDR, SATPTR                          ; 3135
                                  70   13 0005B 3$:    BEQL    15$                                             ; 3138
                 04 A2                 54   D1 0005D       CMPL    PCVAL, 4(SATPTR)                            ; 3139
                                  06   19 00061       BLSS    4$                                              ;
                 08 A2                 54   D1 00063       CMPL    PCVAL, 8(SATPTR)                            ;
                                  05   15 00067       BLEQ    5$                                              ;
                    52                 62   D0 00069 4$:    MOVL    (SATPTR), SATPTR                            ; 3143
                                  ED   11 0006C       BRB     3$                                              ; 3136
                    53       0C   A2   D0 0006E 5$:    MOVL    12(SATPTR), MODPTR                          ; 3150
                    01       28   A3   E8 00072       BLBS    40(MODPTR), 6$                              ; 3151
                                  04   00076       RET                                                     ;
          0B        28   A3             01   E0 00077 6$:    BBS     #1, 40(MODPTR), 7$                      ; 3152
                                  7E   D4 0007C       CLRL    -(SP)                                           ; 3154
                                  53   DD 0007E       PUSHL   MODPTR                                          ;
              00000000G 00              02   FB 00080       CALLS   #2, DBG$RST_BUILD                       ;
                                  51   D4 00087 7$:    CLRL    RSTPTR                                          ; 3155
                    52       18   A3   D0 00089       MOVL    24(MODPTR), SATPTR                          ; 3156
                                  3C   13 0008D 8$:    BEQL    14$                                             ; 3159
                    54       04   A2   D1 0008F       CMPL    4(SATPTR), PCVAL                            ; 3160
                                  36   14 00093       BGTR    14$                                             ;
                    54       08   A2   D1 00095       CMPL    8(SATPTR), PCVAL                            ; 3161
                                  2B   19 00099       BLSS    13$                                             ;
                    50       0C   A2   D0 0009B       MOVL    12(SATPTR), RPTR                            ; 3164
                    02       14   A0   91 0009F       CMPB    20(RPTR), #2                                ; 3169
                                  06   13 000A3       BEQL    9$                                              ;
                    03       14   A0   91 000A5       CMPB    20(RPTR), #3                                ; 3170
                                  1B   12 000A9       BNEQ    13$                                             ;
                                  51   D5 000AB 9$:    TSTL    RSTPTR                                          ; 3178
```

```
                                    0B  13 000AD          BEQL    11$                                     ;
                          01    14  A0  91 000AF 10$:     CMPB    20(RPTR), #1                            ; 3188
                                    11  13 000B3          BEQL    13$                                     ;
                          51        50  D1 000B5          CMPL    RPTR, RSTPTR                            ; 3190
                                    06  12 000B8          BNEQ    12$                                     ;
                          51    0C  A2  D0 000BA 11$:     MOVL    12(SATPTR), RSTPTR                      ; 3193
                                    06  11 000BE          BRB     13$                                     ; 3192
                          50    10  A0  D0 000C0 12$:     MOVL    16(RPTR), RPTR                          ; 3197
                                    E9  11 000C4          BRB     10$                                     ; 3188
                          52        62  D0 000C6 13$:     MOVL    (SATPTR), SATPTR                        ; 3204
                                    C2  11 000C9          BRB     8$                                      ; 3157
                                    51  D5 000CB 14$:     TSTL    RSTPTR                                  ; 3211
                                    5E  13 000CD 15$:     BEQL    21$                                     ;
                08  BC              53  D0 000CF          MOVL    MODPTR, @MODRSTPTR                      ; 3217
                0C  BC              51  D0 000D3          MOVL    RSTPTR, @SCOPE                          ; 3218
                              10    BC  D4 000D7          CLRL    @INVOCNUM                               ; 3224
                          52        51  D0 000DA          MOVL    RSTPTR, ROUTPTR                         ; 3225
                          02    14  A2  91 000DD 16$:     CMPB    20(ROUTPTR), #2                         ; 3226
                                    0C  13 000E1          BEQL    17$                                     ;
                          01    14  A2  91 000E3          CMPB    20(ROUTPTR), #1                         ; 3228
                                    44  13 000E7          BEQL    21$                                     ;
                          52    10  A2  D0 000E9          MOVL    16(ROUTPTR), ROUTPTR                    ; 3229
                                    EE  11 000ED          BRB     16$                                     ; 3226
                          54        67  D0 000EF 17$:     MOVL    DBG$RUNFRAME+64, PCVAL                  ; 3232
                          56    F8  A7  D0 000F2          MOVL    DBG$RUNFRAME+56, FRAMEPTR               ; 3233
                          6E    C0  A7  D0 000F6          MOVL    DBG$RUNFRAME, RUNFRAME_PTR              ; 3234
                                    53  D4 000FA          CLRL    I                                       ; 3237
                                    2A  11 000FC          BRB     20$                                     ;
                    18  A2              54  D1 000FE 18$:     CMPL    PCVAL, 24(ROUTPTR)                      ;
                                    09  19 00102          BLSS    19$                                     ;
                    1C  A2              54  D1 00104          CMPL    PCVAL, 28(ROUTPTR)                      ; 3238
                                    03  14 00108          BGTR    19$                                     ;
                              10    BC  D6 0010A          INCL    @INVOCNUM                               ; 3240
                              04    AE  9F 0010D 19$:     PUSHAB  REGVEC                                  ; 3242
                              04    AE  9F 00110          PUSHAB  RUNFRAME_PTR                            ;
                                    56  DD 00113          PUSHL   FRAMEPTR                                ;
                0000V       CF        03  FB 00115          CALLS   #3, GET_REGISTER_VALUES                 ;
                          55    40  AE  D0 0011A          MOVL    REGVEC+60, REGPTR                       ; 3243
                          54        65  D0 0011E          MOVL    (REGPTR), PCVAL                         ; 3244
                          55    38  AE  D0 00121          MOVL    REGVEC+52, REGPTR                       ; 3245
                          56        65  D0 00125          MOVL    (REGPTR), FRAMEPTR                      ; 3246
          D1              53    04  AC  F3 00128 20$:     AOBLEQ  SCOPE_NUMBER, I, 18$                    ; 3235
                                    04  00129 21$:     RET                                             ; 3254

; Routine Size:  302 bytes,    Routine Base:  DBG$CODE + 13B1
```

```
;3140     3255  1 GLOBAL ROUTINE DBG$STA_RECORD_COMPONENT(RECSYMID, INDEX) =
;3141     3256  1 !
;3142     3257  1 ! FUNCTION
;3143     3258  1 !       This routine returns the SYMID of the N-th record component of a record
;3144     3259  1 !       data object.  It accepts as input a pointer to a Data RST Entry of a
;3145     3260  1 !       record (''structure'') data object and an index (''N'') into the list of
;3146     3261  1 !       record components for the record.  This routine is used mainly to find
;3147     3262  1 !       the logical successor or predecessor of a record component of a known
;3148     3263  1 !       index into the record component list.  In other words, if the current
;3149     3264  1 !       location is the N-th component of a record, its predecessor is the N-1
;3150     3265  1 !       and its successor the N+1 component of the record.  This routine returns
;3151     3266  1 !       a pointer to the Data RST Entry for such a component.
;3152     3267  1 !
;3153     3268  1 !       To accomplish this, the INDEX-th record component is looked up in the
;3154     3269  1 !       component list in the record's Data Type RST Entry.  This gives a
;3155     3270  1 !       pointer to the component's Type Component RST Entry.  A new Data Item
;3156     3271  1 !       RST Entry is then build from the information in the Type Component
;3157     3272  1 !       RST Entry.  This new entry is put on the Temporary RST Entry List and
;3158     3273  1 !       its address is returned as the component SYMID.
;3159     3274  1 !
;3160     3275  1 ! INPUTS
;3161     3276  1 !       RECSYMID - The SYMID of the Record data object whose INDEX-th component
;3162     3277  1 !                  is to be returned.
;3163     3278  1 !
;3164     3279  1 !       INDEX    - The index of the desired component into the record component
;3165     3280  1 !                  list for RECSYMID.  The first component of a record has the
;3166     3281  1 !                  INDEX value of 1.
;3167     3282  1 !
;3168     3283  1 ! OUTPUTS
;3169     3284  1 !       The SYMID of the INDEX-th component of RECSYMID is returned as the
;3170     3285  1 !                  routine value.  If INDEX is out of range (no such component
;3171     3286  1 !                  number), this routine returns zero.
;3172     3287  1 !
;3173     3288  1
;3174     3289  2     BEGIN
;3175     3290  2
;3176     3291  2     MAP
;3177     3292  2         RECSYMID: REF RST$ENTRY;          ! SYMID of record data object
;3178     3293  2
;3179     3294  2     LOCAL
;3180     3295  2         FCODE,
;3181     3296  2         NEWRSTPTR: REF RST$ENTRY,         ! Pointer to new Data Item RST Entry
;3182     3297  2         RSTPTR: REF RST$ENTRY,            ! Pointer to Type Component RST Entry
;3183     3298  2         TYPCOMPLST: REF VECTOR[,LONG],    ! Pointer to type component list
;3184     3299  2         TYPEPTR: REF RST$ENTRY;           ! Pointer to record's Type RST Entry
;3185     3300  2
;3186     3301  2
;3187     3302  2
;3188     3303  2     ! Check that RECSYMID points to the Data Item RST Entry for a Record object.
;3189     3304  2     ! If not, signal an internal DEBUG error.
;3190     3305  2     !
;3191     3306  2     IF .RECSYMID[RST$B_KIND] NEQ RST$K_DATA
;3192     3307  2     THEN
;3193     3308  2         $DBG_ERROR('RSTACCESS\RECORD_COMPONENT 10');
;3194     3309  2
;3195     3310  2     DBG$STA_SYMTYPE(.RECSYMID,FCODE,TYPEPTR);
;3196     3311  2     IF .FCODE EQL RST$K_TYPE_ARRAY
```

```
;  3197          3312  2     THEN
;  3198          3313  2         BEGIN
;  3199          3314  2         LOCAL DSCADDR,NDIMS,DIMVECPTR,BITSIZE;
;  3200          3315  2         DBG$STA_TYP_ARRAY(.TYPEPTR,DSCADDR,TYPEPTR,NDIMS,DIMVECPTR,BITSIZE);
;  3201          3316  2         END;
;  3202          3317  2
;  3203          3318  2     IF .TYPEPTR[RST$B_FCODE] NEQ RST$K_TYPE_RECORD
;  3204          3319  2     THEN
;  3205          3320  2         $DBG_ERROR('RSTACCESS\RECORD_COMPONENT 20');
;  3206          3321  2
;  3207          3322  2
;  3208          3323  2     ! If the INDEX value is out of range, return zero to the caller.  Otherwise,
;  3209          3324  2     ! pick up a pointer to the INDEX-th Type Component RST Entry.
;  3210          3325  2     !
;  3211          3326  2     IF (.INDEX LEQ 0) OR (.INDEX GTR .TYPEPTR[RST$L_TYPCOMPCNT]) THEN RETURN 0;
;  3212          3327  2     TYPCOMPLST = TYPEPTR[RST$A_TYPCOMPLST];
;  3213          3328  2     RSTPTR = .TYPCOMPLST[.INDEX - 1];
;  3214          3329  2     IF .RSTPTR[RST$B_KIND] NEQ RST$K_TYPCOMP
;  3215          3330  2     THEN
;  3216          3331  2         $DBG_ERROR('RSTACCESS\RECORD_COMPONENT 30');
;  3217          3332  2
;  3218          3333  2
;  3219          3334  2     ! Now construct a Data Item RST Entry from the Type Component RST Entry,
;  3220          3335  2     ! make its up-scope pointer point to the RECSYMID Data Item RST Entry,
;  3221          3336  2     ! and return the address (i.e., SYMID) of the new RST entry to the caller.
;  3222          3337  2     ! Note that the new RST entry is put on the Temporary RST Entry List.
;  3223          3338  2     !
;  3224          3339  2     NEWRSTPTR = DBG$GET_MEMORY(RST$K_DATENTSIZ);
;  3225          3340  2     NEWRSTPTR[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  3226          3341  2     RST$TEMP_LIST = .NEWRSTPTR;
;  3227          3342  2     NEWRSTPTR[RST$L_DSTPTR] = .RSTPTR[RST$L_DSTPTR];
;  3228          3343  2     NEWRSTPTR[RST$L_UPSCOPEPTR] = .RECSYMID;
;  3229          3344  2     NEWRSTPTR[RST$B_KIND] = RST$K_DATA;
;  3230          3345  2     NEWRSTPTR[RST$L_TYPEPTR] = .RSTPTR[RST$L_TYPEPTR];
;  3231          3346  2     RETURN .NEWRSTPTR;
;  3232          3347  2
;  3233          3348  1     END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

4F 43 45 52 5C 53 53 45 43 43 41 54 53 52 1D  000C0 P.AAR:    .ASCII  <29>\RSTACCESS\<92>\RECORD_COMPONENT 1\
   31 20 54 4E 45 4E 4F 50 4D 4F 43 5F 44 52  000CF
                                           30  000DD          .ASCII  \0\
4F 43 45 52 5C 53 53 45 43 43 41 54 53 52 1D  000DE P.AAS:    .ASCII  <29>\RSTACCESS\<92>\RECORD_COMPONENT 2\
   32 20 54 4E 45 4E 4F 50 4D 4F 43 5F 44 52  000ED
                                           30  000FB          .ASCII  \0\
4F 43 45 52 5C 53 53 45 43 43 41 54 53 52 1D  000FC P.AAT:    .ASCII  <29>\RSTACCESS\<92>\RECORD_COMPONENT 3\
   33 20 54 4E 45 4E 4F 50 4D 4F 43 5F 44 52  0010B
                                           30  00119          .ASCII  \0\


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                        007C 00000              .ENTRY  DBG$STA_RECORD_COMPONENT, Save R2,R3,R4,R5,-; 3255
```

```
                                                                R6
                        56 00000000G   00   9E 00002          MOVAB   RST$TEMP_LIST, R6                                       ;
                        55 00000000'   EF   9E 00009          MOVAB   P.AAR, R5                                               ;
                        54 00000000G   00   9E 00010          MOVAB   LIB$SIGNAL, R4                                          ;
                        5E             18   C2 00017          SUBL2   #24, SP                                                 ;
                        53       04    AC   D0 0001A          MOVL    RECSYMID, R3                                    3306    ;
                        06       14    A3   91 0001E          CMPB    20(R3), #6                                              ;
                                       0D   13 00022          BEQL    1$                                                      ;
                                       55   DD 00024          PUSHL   R5                                              3308    ;
                                       01   DD 00026          PUSHL   #1                                                      ;
                           00028362    8F   DD 00028          PUSHL   #164706                                                 ;
                        64             03   FB 0002E          CALLS   #3, LIB$SIGNAL                                          ;
                                 10    AE   9F 00031  1$:      PUSHAB  TYPEPTR                                         3310    ;
                                 04    AE   9F 00034          PUSHAB  FCODE                                                   ;
                                       53   DD 00037          PUSHL   R3                                                      ;
                00000000G      00          03   FB 00039     CALLS   #3, DBG$STA_SYMTYPE                                     ;
                               01          6E   D1 00040     CMPL    FCODE, #1                                       3311    ;
                                           19   12 00043     BNEQ    2$                                                      ;
                                 04    AE   9F 00045          PUSHAB  BITSIZE                                         3315    ;
                                 0C    AE   9F 00048          PUSHAB  DIMVECPTR                                               ;
                                 14    AE   9F 0004B          PUSHAB  NDIMS                                                   ;
                                 1C    AE   9F 0004E          PUSHAB  TYPEPTR                                                 ;
                                 24    AE   9F 00051          PUSHAB  DSCADDR                                                 ;
                                 24    AE   DD 00054          PUSHL   TYPEPTR                                                 ;
                00000000G      00          06   FB 00057     CALLS   #6, DBG$STA_TYP_ARRAY                                   ;
                               52    10    AE   D0 0005E  2$:      MOVL    TYPEPTR, R2                                     3318    ;
                               07    18    A2   91 00062          CMPB    24(R2), #7                                              ;
                                           0E   13 00066          BEQL    3$                                                      ;
                                 1E    A5   9F 00068          PUSHAB  P.AAS                                           3320    ;
                                       01   DD 0006B          PUSHL   #1                                                      ;
                           00028362    8F   DD 0006D          PUSHL   #164706                                                 ;
                        64             03   FB 00073          CALLS   #3, LIB$SIGNAL                                          ;
                        51       08    AC   D0 00076  3$:      MOVL    INDEX, R1                                       3326    ;
                                       45   15 0007A          BLEQ    5$                                                      ;
                           28    A2          51   D1 0007C     CMPL    R1, 40(R2)                                              ;
                                           3F   14 00080          BGTR    5$                                                      ;
                        50       2C    A2   9E 00082          MOVAB   44(R2), TYPCOMPLST                              3327    ;
                        52       FC  A041   D0 00086          MOVL    -4(TYPCOMPLST)[R1], RSTPTR                      3328    ;
                        0A       14    A2   91 0008B          CMPB    20(RSTPTR), #10                                 3329    ;
                                           0E   13 0008F          BEQL    4$                                                      ;
                                 3C    A5   9F 00091          PUSHAB  P.AAT                                           3331    ;
                                       01   DD 00094          PUSHL   #1                                                      ;
                           00028362    8F   DD 00096          PUSHL   #164706                                                 ;
                        64             03   FB 0009C          CALLS   #3, LIB$SIGNAL                                          ;
                                       07   DD 0009F  4$:      PUSHL   #7                                              3339    ;
                00000000G      00          01   FB 000A1     CALLS   #1, DBG$GET_MEMORY                                      ;
                               60          66   D0 000A8     MOVL    RST$TEMP_LIST, (NEWRSTPTR)                      3340    ;
                               66          50   D0 000AB     MOVL    NEWRSTPTR, RST$TEMP_LIST                        3341    ;
                           0C  A0       0C    A2   D0 000AE  MOVL    12(RSTPTR), 12(NEWRSTPTR)                       3342    ;
                           10  A0             53   D0 000B3  MOVL    R3, 16(NEWRSTPTR)                               3343    ;
                           14  A0             06   90 000B7  MOVB    #6, 20(NEWRSTPTR)                               3344    ;
                           18  A0       18    A2   D0 000BB  MOVL    24(RSTPTR), 24(NEWRSTPTR)                       3345    ;
                                           04   000C0        RET                                                     3346    ;
                                       50   D4 000C1  5$:      CLRL    R0                                              3348    ;
                                           04   000C3        RET                                                             ;

; Routine Size:  196 bytes,    Routine Base:  DBG$CODE + 14DF
```

```
;  3235     3349  1 GLOBAL ROUTINE DBG$STA_RECORD_INDEX(RECSYMID, COMPSYMID) =
;  3236     3350  1 !
;  3237     3351  1 ! FUNCTION
;  3238     3352  1 !       This routine accepts the SYMID of a Record data object and the SYMID
;  3239     3353  1 !       of a component of that record and it returns the index of the component
;  3240     3354  1 !       in the record's component list.  Both the Record and Component SYMIDs
;  3241     3355  1 !       should point to Data Item RST Entries (kind is RST$K_DATA).  The re-
;  3242     3356  1 !       turned index starts at 1 so that the index of the first component of
;  3243     3357  1 !       the record is 1, the index of the second component is 2, and so forth.
;  3244     3358  1 !       This routine is used together with routine DBG$STA_RECORD_COMPONENT in
;  3245     3359  1 !       the processing of logical predecessors and successors.
;  3246     3360  1 !
;  3247     3361  1 !       If the COMPSYMID object is not a component of the RECSYMID object or if
;  3248     3362  1 !       the RECSYMID object is not of a Record type, an internal DEBUG error is
;  3249     3363  1 !       signalled.
;  3250     3364  1 !
;  3251     3365  1 !       The routine does it job by searching the Type Component List in the
;  3252     3366  1 !       Data Type RST Entry for the record type for a Type Component RST Entry
;  3253     3367  1 !       which has the same DST pointer as the COMPSYMID Data Item RST Entry.
;  3254     3368  1 !       When such an entry is found, its index in the list is returned.
;  3255     3369  1 !
;  3256     3370  1 ! INPUTS
;  3257     3371  1 !       RECSYMID - The SYMID of a Record ("structure") data object.  Its kind
;  3258     3372  1 !                  must be RST$K_DATA.
;  3259     3373  1 !
;  3260     3374  1 !       COMPSYMID - The SYMID of a component of the RECSYMID record.  Its kind
;  3261     3375  1 !                   must also be RST$K_DATA.
;  3262     3376  1 !
;  3263     3377  1 ! OUTPUTS
;  3264     3378  1 !       The index of the COMPSYMID data object in the record component list for
;  3265     3379  1 !       the RECSYMID data record.  The first component has index 1.
;  3266     3380  1 !
;  3267     3381  1
;  3268     3382  2     BEGIN
;  3269     3383  2
;  3270     3384  2     MAP
;  3271     3385  2         RECSYMID: REF RST$ENTRY,          ! Pointer to Data RST Entry for record
;  3272     3386  2         COMPSYMID: REF RST$ENTRY;         ! Pointer to Data RST Entry for a com-
;  3273     3387  2                                           !      ponent within the above record
;  3274     3388  2
;  3275     3389  2     LOCAL
;  3276     3390  2         FCODE,
;  3277     3391  2         RSTPTR: REF RST$ENTRY,            ! Pointer to Type Component RST Entry
;  3278     3392  2         TYPCOMPLST: REF VECTOR[,LONG],    ! Pointer to type component list in the
;  3279     3393  2                                           !      Data Type RST Entry
;  3280     3394  2         TYPEPTR: REF RST$ENTRY;           ! Pointer to Type RST Entry for record
;  3281     3395  2
;  3282     3396  2
;  3283     3397  2
;  3284     3398  2     ! Make sure RECSYMID points to a Data Item RST Entry for a record and that
;  3285     3399  2     ! COMPSYMID points to a Data Item RST Entry.  Get a pointer to the Type RST
;  3286     3400  2     ! Entry for the record type.
;  3287     3401  2     !
;  3288     3402  2     IF (.RECSYMID[RST$B_KIND] NEQ RST$K_DATA) OR
;  3289     3403  3        (.COMPSYMID[RST$B_KIND] NEQ RST$K_DATA)
;  3290     3404  2     THEN
;  3291     3405  2         $DBG_ERROR('RSTACCESS\RECORD_INDEX 10');
```

```
;  3292          3406  2
;  3293          3407  2      DBG$STA_SYMTYPE(.RECSYMID,FCODE,TYPEPTR);
;  3294          3408  2      IF (.FCODE EQL RST$K_TYPE_ARRAY)
;  3295          3409  2      THEN
;  3296          3410  2          BEGIN
;  3297          3411  2          LOCAL DSCADDR,NDIMS,DIMVECPTR,BITSIZE;
;  3298          3412  2          DBG$STA_TYP_ARRAY(.TYPEPTR,DSCADDR,TYPEPTR,NDIMS,DIMVECPTR,BITSIZE);
;  3299          3413  2          END;
;  3300          3414  2
;  3301          3415  2      IF .TYPEPTR[RST$B_FCODE] NEQ RST$K_TYPE_RECORD
;  3302          3416  2      THEN
;  3303          3417  2          $DBG_ERROR('RSTACCESS\RECORD_INDEX 20');
;  3304          3418  2
;  3305          3419  2
;  3306          3420  2      ! Now loop through the record components for the RECSYMID Record Data Type.
;  3307          3421  2      ! For each component, we get an index and a pointer to the corresponding
;  3308          3422  2      ! Type Component RST Entry.  If that Type Component RST Entry has the same
;  3309          3423  2      ! DST pointer as COMPSYMID, we return that component's index.
;  3310          3424  2      !
;  3311          3425  2      TYPCOMPLST = TYPEPTR[RST$A_TYPCOMPLST];
;  3312          3426  2      INCR INDEX FROM 1 TO .TYPEPTR[RST$L_TYPCOMPCNT] DO
;  3313          3427  2          BEGIN
;  3314          3428  2          RSTPTR = .TYPCOMPLST[.INDEX - 1];
;  3315          3429  2          IF .RSTPTR[RST$L_DSTPTR] EQL .COMPSYMID[RST$L_DSTPTR] THEN RETURN .INDEX;
;  3316          3430  2          END;
;  3317          3431  2
;  3318          3432  2
;  3319          3433  2      ! We did not find COMPSYMID in the component list.  Signal an error.
;  3320          3434  2      !
;  3321          3435  2      $DBG_ERROR('RSTACCESS\RECORD_INDEX 30');
;  3322          3436  2      RETURN 0;
;  3323          3437  2
;  3324          3438  1      END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

4F 43 45 52 5C 53 53 45 43 43 41 54 53 52 19  0011A P.AAU:    .ASCII  <25>\RSTACCESS\<92>\RECORD_INDEX 10\          ;
                30 31 20 58 45 44 4E 49 5F 44 52  00129
4F 43 45 52 5C 53 53 45 43 43 41 54 53 52 19  00134 P.AAV:    .ASCII  <25>\RSTACCESS\<92>\RECORD_INDEX 20\          ;
                30 32 20 58 45 44 4E 49 5F 44 52  00143
4F 43 45 52 5C 53 53 45 43 43 41 54 53 52 19  0014E P.AAW:    .ASCII  <25>\RSTACCESS\<92>\RECORD_INDEX 30\          ;
                30 33 20 58 45 44 4E 49 5F 44 52  0015D


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                  007C 00000    .ENTRY  DBG$STA_RECORD_INDEX, Save R2,R3,R4,R5,R6     ; 3349
                56 00000000'  EF   9E 00002     MOVAB   P.AAU, R6                                                    ;
                55 00000000G  00   9E 00009     MOVAB   LIB$SIGNAL, R5                                               ;
                5E            18   C2 00010     SUBL2   #24, SP                                                      ;
                52      04    AC   D0 00013     MOVL    RECSYMID, R2                                                 ; 3402
                06      14    A2   91 00017     CMPB    20(R2), #6                                                   ;
                              0A   12 0001B     BNEQ    1$                                                           ;
                50      08    AC   D0 0001D     MOVL    COMPSYMID, R0                                                ; 3403
```

```
                    06        14    A0  91  00021          CMPB    20(R0), #6                                      ;
                                    0D  13  00025          BEQL    2$                                              ;
                                    56  DD  00027  1$:     PUSHL   R6                                              ; 3405
                                    01  DD  00029          PUSHL   #1                                              ;
                          00028362  8F  DD  0002B          PUSHL   #164706                                         ;
                    65              03  FB  00031          CALLS   #3, LIB$SIGNAL                                  ;
                                10  AE  9F  00034  2$:     PUSHAB  TYPEPTR                                         ; 3407
                                04  AE  9F  00037          PUSHAB  FCODE                                           ;
                                    52  DD  0003A          PUSHL   R2                                              ;
00000000G           00              03  FB  0003C          CALLS   #3, DBG$STA_SYMTYPE                             ;
                    01              6E  D1  00043          CMPL    FCODE, #1                                       ; 3408
                                    19  12  00046          BNEQ    3$                                              ;
                                04  AE  9F  00048          PUSHAB  BITSIZE                                         ; 3412
                                0C  AE  9F  0004B          PUSHAB  DIMVECPTR                                       ;
                                14  AE  9F  0004E          PUSHAB  NDIMS                                           ;
                                1C  AE  9F  00051          PUSHAB  TYPEPTR                                         ;
                                24  AE  9F  00054          PUSHAB  DSCADDR                                         ;
                                24  AE  DD  00057          PUSHL   TYPEPTR                                         ;
00000000G           00              06  FB  0005A          CALLS   #6, DBG$STA_TYP_ARRAY                           ;
                    54          10  AE  D0  00061  3$:     MOVL    TYPEPTR, R4                                     ; 3415
                    07          18  A4  91  00065          CMPB    24(R4), #7                                      ;
                                    0E  13  00069          BEQL    4$                                              ;
                                1A  A6  9F  0006B          PUSHAB  P.AAV                                           ; 3417
                                    01  DD  0006E          PUSHL   #1                                              ;
                          00028362  8F  DD  00070          PUSHL   #164706                                         ;
                    65              03  FB  00076          CALLS   #3, LIB$SIGNAL                                  ;
                    50          2C  A4  9E  00079  4$:     MOVAB   44(R4), TYPCOMPLST                              ; 3425
                    52          08  AC  D0  0007D          MOVL    COMPSYMID, R2                                   ; 3429
                                    51  D4  00081          CLRL    INDEX                                           ;
                                    10  11  00083          BRB     6$                                              ;
                    53          FC  A041  D0  00085  5$:     MOVL    -4(TYPCOMPLST)[INDEX], RSTPTR                   ; 3428
                0C  A2          0C  A3  D1  0008A          CMPL    12(RSTPTR), 12(R2)                              ; 3429
                                    04  12  0008F          BNEQ    6$                                              ;
                    50              51  D0  00091          MOVL    INDEX, R0                                       ;
                                        04  00094          RET                                                     ;
                EB          51      28  A4  F3  00095  6$:     AOBLEQ  40(R4), INDEX, 5$                           ; 3426
                                    34  A6  9F  0009A          PUSHAB  P.AAW                                           ; 3435
                                        01  DD  0009D          PUSHL   #1                                              ;
                              00028362  8F  DD  0009F          PUSHL   #164706                                         ;
                        65              03  FB  000A5          CALLS   #3, LIB$SIGNAL                                  ;
                                        50  D4  000A8          CLRL    R0                                              ; 3436
                                            04  000AA          RET                                                     ; 3438

; Routine Size:  171 bytes,    Routine Base:  DBG$CODE + 15A3
```

```
;  3326     3439  1 GLOBAL ROUTINE DBG$STA_REGISTER_NAME(REGDESCR) =
;  3327     3440  1 !
;  3328     3441  1 ! FUNCTION
;  3329     3442  1 !       This routine converts a Register Descriptor into a Counted ASCII name
;  3330     3443  1 !       for the corresponding register.  A Register Descriptor is produced
;  3331     3444  1 !       from an absolute address by routine DBG$STA_ADDRESS_TO_REGDESCR if
;  3332     3445  1 !       the address points into the DBG$REG_VALUES register save area set up
;  3333     3446  1 !       by DBG$STA_SETCONTEXT.  The Register Descriptor contains the register
;  3334     3447  1 !       number, a byte offset, and the scope number of the register described.
;  3335     3448  1 !       A register address is not a normal address, and should be printed as
;  3336     3449  1 !       a scope number or scope name followed by a register name.  This routine
;  3337     3450  1 !       builds such a register name as a Counted ASCII string (for example
;  3338     3451  1 !       "2\%R5") and returns a pointer to that string.
;  3339     3452  1 !
;  3340     3453  1 ! INPUTS
;  3341     3454  1 !       REGDESCR - The Register Descriptor which describes the register name
;  3342     3455  1 !                  to be generated.
;  3343     3456  1 !
;  3344     3457  1 ! OUTPUTS
;  3345     3458  1 !       A pointer to a Counted ASCII string containing the appropriate register
;  3346     3459  1 !                  name is returned as the routine value.
;  3347     3460  1 !
;  3348     3461  1
;  3349     3462  2     BEGIN
;  3350     3463  2
;  3351     3464  2     MAP
;  3352     3465  2         REGDESCR: DBG$REGDESCR;          ! Input Register Descriptor
;  3353     3466  2
;  3354     3467  2     LOCAL
;  3355     3468  2         INDEX,                           ! Character index within REGTABLE entry
;  3356     3469  2         INVOCNUM,                        ! Invocation number for scope routine
;  3357     3470  2         LENGTH,                          ! Current length of ASCII string
;  3358     3471  2         MODRSTPTR,                       ! Module SYMID containing the scope
;  3359     3472  2         NAMEPTR: REF VECTOR[,BYTE],      ! Pointer to Counted ASCII string con-
;  3360     3473  2                                          !     taining the built register name
;  3361     3474  2         PATHDESC,                        ! Pointer to Pathname Descriptor for
;  3362     3475  2                                          !     routine name of desired scope
;  3363     3476  2         PATHSTRING: REF VECTOR[,BYTE],   ! Pointer to Counted ASCII string for
;  3364     3477  2                                          !     routine name of desired scope
;  3365     3478  2         REGPTR: REF VECTOR[,BYTE],       ! Pointer to register name in REGTABLE
;  3366     3479  2         RSTPTR,                          ! Pointer to RST entry of scope routine
;  3367     3480  2         SCOPENUM,                        ! Temporary value of scope number
;  3368     3481  2         TEMPNUM,                         ! Temporary in computing scope number
;  3369     3482  2         TEMPSTR: VECTOR[12,BYTE];        ! Temporary buffer for scope number
;  3370     3483  2
;  3371     3484  2     BIND
;  3372     3485  2         REGTABLE = UPLIT ('R0  ', 'R1  ', 'R2  ', 'R3  ', ! Register name table
;  3373     3486  2                           'R4  ', 'R5  ', 'R6  ', 'R7  ',
;  3374     3487  2                           'R8  ', 'R9  ', 'R10 ', 'R11 ',
;  3375     3488  2                           'AP  ', 'FP  ', 'SP  ', 'PC  ',
;  3376     3489  2                           'PSL '): VECTOR[,LONG];
;  3377     3490  2
;  3378     3491  2
;  3379     3492  2
;  3380     3493  2     ! Check that we really have a valid Register Descriptor.
;  3381     3494  2     !
;  3382     3495  2     IF (.REGDESCR[DBG$V_REGD_SENTINEL] NEQ %X'2D') OR
```

```
;  3383          3496  3          (.REGDESCR[DBG$B_REGD_REGNUM] GTR 16)
;  3384          3497  2      THEN
;  3385          3498  2          $DBG_ERROR('RSTACCESS\REGISTER_NAME');
;  3386          3499  2
;  3387          3500  2
;  3388          3501  2      ! If the scope specified by the the Register Descriptor is in a set module,
;  3389          3502  2      ! we should be able to symbolize the scope as a routine name.  We thus call
;  3390          3503  2      ! NUMBERED_SCOPE to get a routine SYMID for the scope.  If this succeeds,
;  3391          3504  2      ! we convert that SYMID to a name string (in Counted ASCII) and leave that
;  3392          3505  2      ! name in a temporary memory block pointed to by NAMEPTR.
;  3393          3506  2      !
;  3394          3507  2      SCOPENUM = .REGDESCR[DBG$W_REGD_SCOPENUM];
;  3395          3508  2      IF .DBG$GB_MOD_PTR[MODE_SYMBOLS]
;  3396          3509  2      THEN
;  3397          3510  2          DBG$STA_NUMBERED_SCOPE(.SCOPENUM, MODRSTPTR, RSTPTR, INVOCNUM)
;  3398          3511  2      ELSE
;  3399          3512  2          MODRSTPTR = 0;
;  3400          3513  2
;  3401          3514  2      IF .MODRSTPTR NEQ 0
;  3402          3515  2      THEN
;  3403          3516  3          BEGIN
;  3404          3517  3          IF .INVOCNUM NEQ 0 THEN RSTPTR = DBG$BUILD_INVOC_RST(.RSTPTR, .INVOCNUM);
;  3405          3518  3          DBG$STA_SYMPATHNAME(.RSTPTR, PATHDESC);
;  3406          3519  3          DBG$NPATHDESC_TO_CS(.PATHDESC, PATHSTRING);
;  3407          3520  3          LENGTH = .PATHSTRING[0];
;  3408          3521  3          NAMEPTR = DBG$GET_TEMPMEM((.LENGTH + 8 + %UPVAL - 1)/%UPVAL);
;  3409          3522  3          CH$MOVE(.LENGTH + 1, .PATHSTRING, .NAMEPTR);
;  3410          3523  3          END
;  3411          3524  3
;  3412          3525  3
;  3413          3526  3      ! No specific routine name can be found for this scope in the RST.  We
;  3414          3527  3      ! therefore must represent the scope by a scope number.  We first get a
;  3415          3528  3      ! temporary memory block and initialize an empty Counted ASCII string in
;  3416          3529  3      ! it.  We then convert the register's scope number to a decimal Counted
;  3417          3530  3      ! ASCII string.  This becomes the numeric scope which preceeds the actual
;  3418          3531  3      ! register name (for example, the "2" in "2\%R5").
;  3419          3532  3      !
;  3420          3533  2      ELSE
;  3421          3534  3          BEGIN
;  3422          3535  3          NAMEPTR = DBG$GET_TEMPMEM(5);
;  3423          3536  3          LENGTH = 0;
;  3424          3537  3          WHILE TRUE DO
;  3425          3538  4              BEGIN
;  3426          3539  4              TEMPNUM = .SCOPENUM/10;
;  3427          3540  4              TEMPSTR[.LENGTH] = .SCOPENUM - .TEMPNUM*10 + '0';
;  3428          3541  4              LENGTH = .LENGTH + 1;
;  3429          3542  4              IF .TEMPNUM EQL 0 THEN EXITLOOP;
;  3430          3543  4              SCOPENUM = .TEMPNUM;
;  3431          3544  3              END;
;  3432          3545  3
;  3433          3546  3          INCR I FROM 1 TO .LENGTH DO
;  3434          3547  3              NAMEPTR[.I] = .TEMPSTR[.LENGTH - .I];
;  3435          3548  3
;  3436          3549  2          END;
;  3437          3550  2
;  3438          3551  2
;  3439          3552  2      ! We now have the scope name as either a routine name or a scope number in
```

```
;  3440          3553  2     ! the NAMEPTR buffer.  Next we fill in the "\%" that separates the scope
;  3441          3554  2     ! name from the register name.
;  3442          3555  2     !
;  3443          3556  2     NAMEPTR[.LENGTH + 1] = '\';
;  3444          3557  2     NAMEPTR[.LENGTH + 2] = '%';
;  3445          3558  2     LENGTH = .LENGTH + 2;
;  3446          3559  2
;  3447          3560  2
;  3448          3561  2     ! Now fill in the register name itself.  We look it up in REGTABLE, where
;  3449          3562  2     ! each register name is given as four ASCII characters.  This code assumes
;  3450          3563  2     ! that each register name in REGTABLES ends with at least one blank.
;  3451          3564  2     !
;  3452          3565  2     REGPTR = REGTABLE[.REGDESCR[DBG$B_REGD_REGNUM]];
;  3453          3566  2     INDEX = 0;
;  3454          3567  2     WHILE .REGPTR[.INDEX] NEQ ' ' DO
;  3455          3568  3         BEGIN
;  3456          3569  3         LENGTH = .LENGTH + 1;
;  3457          3570  3         NAMEPTR[.LENGTH] = .REGPTR[.INDEX];
;  3458          3571  3         INDEX = .INDEX + 1;
;  3459          3572  2         END;
;  3460          3573  2
;  3461          3574  2
;  3462          3575  2     ! Finally, fill in "+offset" if the offset is non-zero.  (The offset can
;  3463          3576  2     ! only have values 1, 2, or 3 in this case.)
;  3464          3577  2     !
;  3465          3578  2     IF .REGDESCR[DBG$V_REGD_OFFSET] NEQ 0
;  3466          3579  2     THEN
;  3467          3580  3         BEGIN
;  3468          3581  3         NAMEPTR[.LENGTH + 1] = '+';
;  3469          3582  3         NAMEPTR[.LENGTH + 2] = .REGDESCR[DBG$V_REGD_OFFSET] + '0';
;  3470          3583  3         LENGTH = .LENGTH + 2;
;  3471          3584  2         END;
;  3472          3585  2
;  3473          3586  2
;  3474          3587  2     ! Now return a pointer to the Counted ASCII register name string.
;  3475          3588  2     !
;  3476          3589  2     NAMEPTR[0] = .LENGTH;
;  3477          3590  2     RETURN .NAMEPTR;
;  3478          3591  2
;  3479          3592  1     END;


                                                    .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                                20  20  30  52  00168 P.AAX:  .ASCII  \R0  \                ;
                                20  20  31  52  0016C        .ASCII  \R1  \                ;
                                20  20  32  52  00170        .ASCII  \R2  \                ;
                                20  20  33  52  00174        .ASCII  \R3  \                ;
                                20  20  34  52  00178        .ASCII  \R4  \                ;
                                20  20  35  52  0017C        .ASCII  \R5  \                ;
                                20  20  36  52  00180        .ASCII  \R6  \                ;
                                20  20  37  52  00184        .ASCII  \R7  \                ;
                                20  20  38  52  00188        .ASCII  \R8  \                ;
                                20  20  39  52  0018C        .ASCII  \R9  \                ;
                                20  30  31  52  00190        .ASCII  \R10 \                ;
                                20  31  31  52  00194        .ASCII  \R11 \                ;
```

```
                                                20  20  50  41  00198          .ASCII  \AP  \                                          ;
                                                20  20  50  46  0019C          .ASCII  \FP  \                                          ;
                                                20  20  50  53  001A0          .ASCII  \SP  \                                          ;
                                                20  20  43  50  001A4          .ASCII  \PC  \                                          ;
                                                20  4C  53  50  001A8          .ASCII  \PSL \                                          ;
49  47  45  52  5C  53  53  45  43  43  41     54  53  52  17  001AC P.AAY:    .ASCII  <23>\RSTACCESS\<92>\REGISTER_NAME\              ;
                         45  4D  41  4E  5F     52  45  54  53  001BB                                                                  ;

                                                                               REGTABLE=           P.AAX


                                                                               .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                                01FC 00000     .ENTRY  DBG$STA_REGISTER_NAME, Save R2,R3,R4,R5,R6,-;  3439
                                                                               R7,R8                                                  ;
                                                58 00000000G    00   9E 00002  MOVAB   DBG$GET_TEMPMEM, R8                          ;
                                                5E              20   C2 00009  SUBL2   #32, SP                                      ;
          2D        04   AC                   06              02   ED 0000C  CMPZV   #2, #6, REGDESCR, #45                        ;  3495
                                                                06   12 00012  BNEQ    1$                                          ;
                                                10        05    AC   91 00014  CMPB    REGDESCR+1, #16                             ;  3496
                                                                15   1B 00018  BLEQU   2$                                          ;
                                                   00000000'    EF   9F 0001A 1$:     PUSHAB  P.AAY                               ;  3498
                                                                01   DD 00020  PUSHL   #1                                          ;
                                                   00028362     8F   DD 00022  PUSHL   #164706                                      ;
                                   00000000G    00              03   FB 00028  CALLS   #3, LIB$SIGNAL                            ;
                                                52        06    AC   3C 0002F 2$:     MOVZWL  REGDESCR+2, SCOPENUM                ;  3507
                                                50 00000000G    00   D0 00033  MOVL    DBG$GB_MOD_PTR, R0                          ;  3508
                                                11        02    A0   E9 0003A  BLBC    2(R0), 3$                                   ;
                                                                5E   DD 0003E  PUSHL   SP                                          ;  3510
                                                          08    AE   9F 00040  PUSHAB  RSTPTR                                      ;
                                                          10    AE   9F 00043  PUSHAB  MODRSTPTR                                   ;
                                                                52   DD 00046  PUSHL   SCOPENUM                                    ;
                                        FD16    CF              04   FB 00048  CALLS   #4, DBG$STA_NUMBERED_SCOPE                 ;
                                                                03   11 0004D  BRB     4$                                          ;
                                                          08    AE   D4 0004F 3$:     CLRL    MODRSTPTR                           ;  3512
                                                          08    AE   D5 00052 4$:     TSTL    MODRSTPTR                           ;  3514
                                                                47   13 00055  BEQL    6$                                          ;
                                                                6E   D5 00057  TSTL    INVOCNUM                                    ;  3517
                                                                0E   13 00059  BEQL    5$                                          ;
                                                                6E   DD 0005B  PUSHL   INVOCNUM                                    ;
                                                          08    AE   DD 0005D  PUSHL   RSTPTR                                      ;
                                        EA26    CF              02   FB 00060  CALLS   #2, DBG$BUILD_INVOC_RST                    ;
                                          04    AE              50   D0 00065  MOVL    R0, RSTPTR                                  ;
                                                          0C    AE   9F 00069 5$:     PUSHAB  PATHDESC                            ;  3518
                                                          08    AE   DD 0006C  PUSHL   RSTPTR                                      ;
                                        0000V   CF              02   FB 0006F  CALLS   #2, DBG$STA_SYMPATHNAME                   ;
                                                          10    AE   9F 00074  PUSHAB  PATHSTRING                                  ;  3519
                                                          10    AE   DD 00077  PUSHL   PATHDESC                                    ;
                                   00000000G    00              02   FB 0007A  CALLS   #2, DBG$NPATHDESC_TO_CS                   ;
                                                56        10    BE   9A 00081  MOVZBL  @PATHSTRING, LENGTH                        ;  3520
                                                50        0B    A6   9E 00085  MOVAB   11(R6), R0                                 ;  3521
                                   7E           50              04   C7 00089  DIVL3   #4, R0, -(SP)                             ;
                                                68              01   FB 0008D  CALLS   #1, DBG$GET_TEMPMEM                         ;
                                                57              50   D0 00090  MOVL    R0, NAMEPTR                                 ;
                                                50        01    A6   9E 00093  MOVAB   1(R6), R0                                  ;  3522
                                   67       10    BE              50   28 00097  MOVC3   R0, @PATHSTRING, (NAMEPTR)                ;
                                                                38   11 0009C  BRB     11$                                         ;  3514
```

```
                                    05  DD 0009E 6$:     PUSHL   #5                                                       ; 3535
                                68  01  FB 000A0         CALLS   #1, DBG$GET_TEMPMEM
                                57  50  D0 000A3         MOVL    R0, NAMEPTR
                                    56  D4 000A6         CLRL    LENGTH                                                  ; 3536
                             50     52  0A  C7 000A8 7$:  DIVL3   #10, SCOPENUM, TEMPNUM                                 ; 3539
                             51     50  0A  C5 000AC     MULL3   #10, TEMPNUM, R1                                        ; 3540
                                    51  52  C2 000B0     SUBL2   SCOPENUM, R1
                          14 AE46   30  51  83 000B3     SUBB3   R1, #48, TEMPSTR[LENGTH]
                                    56  D6 000B9         INCL    LENGTH                                                  ; 3541
                                    50  D5 000BB         TSTL    TEMPNUM                                                 ; 3542
                                    05  13 000BD         BEQL    8$
                                52  50  D0 000BF         MOVL    TEMPNUM, SCOPENUM                                       ; 3543
                                    E4  11 000C2         BRB     7$                                                      ; 3537
                                    51  D4 000C4 8$:     CLRL    I                                                       ; 3547
                                    0A  11 000C6         BRB     10$
                             50     56  51  C3 000C8 9$:  SUBL3   I, LENGTH, R0
                                6147    14 AE40  90 000CC MOVB    TEMPSTR[R0], (I)[NAMEPTR]
                             F2     51  56  F3 000D2 10$: AOBLEQ  LENGTH, I, 9$
                          01 A647   5C  8F  90 000D6 11$: MOVB    #92, 1(LENGTH)[NAMEPTR]                                 ; 3556
                          02 A647       25  90 000DC     MOVB    #37, 2(LENGTH)[NAMEPTR]                                 ; 3557
                                56      02  C0 000E1     ADDL2   #2, LENGTH                                              ; 3558
                                50  05  AC  9A 000E4     MOVZBL  REGDESCR+1, R0                                          ; 3565
                                50 00000000'EF40  DE 000E8 MOVAL  REGTABLE[R0], REGPTR
                                    51  D4 000F0         CLRL    INDEX                                                   ; 3566
                                20      6140  91 000F2 12$: CMPB    (INDEX)[REGPTR], #32                                ; 3567
                                        09  13 000F6     BEQL    13$
                                    56  D6 000F8         INCL    LENGTH                                                  ; 3569
                                6647        8140  90 000FA MOVB    (INDEX)+[REGPTR], (LENGTH)[NAMEPTR]                     ; 3570
                                        F1  11 000FF     BRB     12$                                                     ; 3567
                                03      04  AC  93 00101 13$: BITB    REGDESCR, #3                                        ; 3578
                                        14  13 00105     BEQL    14$                                                     ; 3581
                             01 A647        2B  90 00107 MOVB    #43, 1(LENGTH)[NAMEPTR]                                 ; 3582
                          50        04  AC  02  EF 0010C EXTZV   #0, #2, REGDESCR, R0
                                02 A647     50  30 81 00112 ADDB3   #48, R0, 2(LENGTH)[NAMEPTR]
                                    56      02  C0 00118 ADDL2   #2, LENGTH                                              ; 3583
                                    67      56  90 0011B 14$: MOVB    LENGTH, (NAMEPTR)                                   ; 3589
                                    50      57  D0 0011E     MOVL    NAMEPTR, R0                                         ; 3590
                                                04 00121     RET                                                         ; 3592

; Routine Size:  290 bytes,    Routine Base:  DBG$CODE + 164E
```

```
;  3481          3593  1 GLOBAL ROUTINE DBG$STA_SAME_DST_OBJECT(SYMID1, SYMID2) =
;  3482          3594  1 !
;  3483          3595  1 ! FUNCTION
;  3484          3596  1 !       This routine determines whether two SYMIDs refer to the same DST object.
;  3485          3597  1 !       To do so, it checks that the corresponding RST entries have the same
;  3486          3598  1 !       kind and the same DST pointer.  (Data records and their types point to
;  3487          3599  1 !       the same DST record; hence the kind must be checked as well.)
;  3488          3600  1 !
;  3489          3601  1 ! INPUTS
;  3490          3602  1 !       SYMID1  - The SYMID of the first of the two symbols to be compared.
;  3491          3603  1 !
;  3492          3604  1 !       SYMID2  - The SYMID of the second of the two symbols to be compared.
;  3493          3605  1 !
;  3494          3606  1 ! OUTPUTS
;  3495          3607  1 !       The value TRUE is returned if both symbols are of the same kind and have
;  3496          3608  1 !                 the same SYMID.  The value FALSE is returned otherwise.
;  3497          3609  1 !
;  3498          3610  1
;  3499          3611  2     BEGIN
;  3500          3612  2
;  3501          3613  2     MAP
;  3502          3614  2         SYMID1: REF RST$ENTRY,          ! Pointer to first RST entry
;  3503          3615  2         SYMID2: REF RST$ENTRY;          ! Pointer to second RST entry
;  3504          3616  2
;  3505          3617  2
;  3506          3618  2
;  3507          3619  2     ! Return the desired boolean value.
;  3508          3620  2     !
;  3509          3621  2     IF (.SYMID1[RST$B_KIND] EQL .SYMID2[RST$B_KIND]) AND
;  3510          3622  3        (.SYMID1[RST$L_DSTPTR] EQL .SYMID2[RST$L_DSTPTR])
;  3511          3623  2     THEN
;  3512          3624  2         RETURN TRUE;
;  3513          3625  2
;  3514          3626  2     RETURN FALSE;
;  3515          3627  2
;  3516          3628  1     END;


                                        0000 00000          .ENTRY  DBG$STA_SAME_DST_OBJECT, Save nothing       ; 3593
                    51      04      AC  D0 00002          MOVL    SYMID1, R1                                  ; 3621
                    50      08      AC  D0 00006          MOVL    SYMID2, R0                                  ;
              14    A0      14      A1  91 0000A          CMPB    20(R1), 20(R0)                              ;
                                    0B  12 0000F          BNEQ    1$                                          ;
              0C    A0      0C      A1  D1 00011          CMPL    12(R1), 12(R0)                              ; 3622
                                    04  12 00016          BNEQ    1$                                          ;
                    50              01  D0 00018          MOVL    #1, R0                                      ; 3624
                                    04  0001B          RET                                                 ;
                                50  D4  0001C 1$:      CLRL    R0                                          ; 3626
                                    04  0001E          RET                                                 ; 3628

; Routine Size:  31 bytes,    Routine Base:  DBG$CODE + 1770
```

```
;  3518          3629  1 GLOBAL ROUTINE DBG$STA_SETCONTEXT(SYMID): NOVALUE =
;  3519          3630  1 !
;  3520          3631  1 ! FUNCTION
;  3521          3632  1 !       This routine sets up the context needed for subsequent DST value spec
;  3522          3633  1 !       evaluations.  This specifically means determining the VAX CALL frame
;  3523          3634  1 !       and associated register values which are to be used for evaluating value
;  3524          3635  1 !       specs and determining symbol addresses.  This routine must therefore
;  3525          3636  1 !       be called before routines DBG$STA_SYMTYPE, DBG$STA_SYMVALUE, and all
;  3526          3637  1 !       routines of the form DBG$STA_TYPE_xxx.  Failure to do so may cause in-
;  3527          3638  1 !       correct value computations.
;  3528          3639  1 !
;  3529          3640  1 !       The context is defined by an input SYMID.  The innermost invocable enti-
;  3530          3641  1 !       ty (i.e. routine) in the environment of the symbol's declaration is
;  3531          3642  1 !       looked up in the VAX CALL stack and the associated register set is loc-
;  3532          3643  1 !       ated.  If an invocation number is attached to the SYMID, that is taken
;  3533          3644  1 !       into account.  Context will not be established (and the previous context
;  3534          3645  1 !       will be deleted) if the input SYMID is zero or if the symbol's environ-
;  3535          3646  1 !       ment is not presently active.  If context is not established, subsequent
;  3536          3647  1 !       value specs may still be evaluated, but if they refer to any register
;  3537          3648  1 !       values or locations (i.e., to any context) an error will be signalled.
;  3538          3649  1 !
;  3539          3650  1 ! INPUTS
;  3540          3651  1 !       SYMID   - The SYMID of the symbol whose environment of declaration is to
;  3541          3652  1 !                 be used to define the context of subsequent value spec.  SYMID
;  3542          3653  1 !                 must be of kind RST$K_DATA or RST$K_TYPCOMP.  If SYMID is zero
;  3543          3654  1 !                 no context is established.
;  3544          3655  1 !
;  3545          3656  1 ! OUTPUTS
;  3546          3657  1 !       NONE
;  3547          3658  1 !
;  3548          3659  1
;  3549          3660  2     BEGIN
;  3550          3661  2
;  3551          3662  2     MAP
;  3552          3663  2         SYMID: REF RST$ENTRY;           ! Pointer to the input RST entry
;  3553          3664  2
;  3554          3665  2     OWN
;  3555          3666  2         SPVALUE: REF VECTOR[,LONG];     ! Current CALL frame's SP value
;  3556          3667  2
;  3557          3668  2     LOCAL
;  3558          3669  2         CURRENT_REG: REF VECTOR[,LONG], ! Pointer to vector of current register
;  3559          3670  2                                         !     values (at top of stack)
;  3560          3671  2         ENDADDR,                        ! The routine's PC end address
;  3561          3672  2         FRAME_FOUND_FLAG,               ! Flag set to TRUE when a CALL frame for
;  3562          3673  2                                         !     the desired routine is found
;  3563          3674  2         FRAMEPTR: REF BLOCK[,BYTE],     ! Pointer to current VAX CALL frame
;  3564          3675  2         INVOC_COUNT,                    ! Number of invocations of routine
;  3565          3676  2                                         !     found so far in CALL stack
;  3566          3677  2         INVOCNUM,                       ! The desired invocation number
;  3567          3678  2         INVPTR: REF RST$ENTRY,          ! Pointer to Invocation Number RST Entry
;  3568          3679  2         J,                              ! CALL frame register-vector index
;  3569          3680  2         PCVAL,                          ! Current CALL frame's PC value
;  3570          3681  2         MODPTR: REF RST$ENTRY,          ! Current Module
;  3571          3682  2         REGMASK: BITVECTOR[16],         ! Register save mask from the CALL frame
;  3572          3683  2         REGPTR: REF VECTOR[,LONG],      ! Pointer to a register's save location
;  3573          3684  2         REGSAVELOC: REF VECTOR[,LONG],  ! Pointer to CALL frame register save
;  3574          3685  2                                         !     area for registers R0 - R11
```

```
;  3575          3686  2          REGVEC: VECTOR[17, LONG],          ! Vector of pointers to save areas for
;  3576          3687  2                                                 the current frame's registers
;  3577          3688  2          ROUTPTR: REF RST$ENTRY,            ! Pointer to Routine RST Entry of rout-
;  3578          3689  2                                                 ine to look for in CALL stack
;  3579          3690  2          RSTPTR: REF RST$ENTRY,             ! RST pointer from SAT entry
;  3580          3691  2          RUNFRAME_PTR,                      ! Pointer to current entry in CALL com-
;  3581          3692  2                                                 mand runframe stack (needed by
;  3582          3693  2                                                 the GET_REGISTER_VALUES routine)
;  3583          3694  2          SATPTR: REF SAT$ENTRY,             ! Pointer to Static Address Table entry
;  3584          3695  2                                                 for possible nested routine
;  3585          3696  2          SCOPE_IS_NUMERIC,                  ! Set to TRUE if context is a numeric
;  3586          3697  2                                                 scope, not an RST routine entry
;  3587          3698  2          SCOPE_NUMBER,                      ! Scope number of the current context
;  3588          3699  2          STARTADDR;                         ! The routine's PC start address
;  3589          3700  2
;  3590          3701  2      ENABLE
;  3591          3702  2          SETCONTEXT_ERROR_HANDLER;          ! Set up error handler for this routine
;  3592          3703  2
;  3593          3704  2
;  3594          3705  2      ! If the input SYMID is zero, clear the current context and return.
;  3595          3706  2      !
;  3596          3707  2      DBG$SCOPE_NUMBER = 0;
;  3597          3708  2      IF .SYMID EQL 0
;  3598          3709  2      THEN
;  3599          3710  3          BEGIN
;  3600          3711  3          CURRENT_REG = DBG$RUNFRAME[DBG$L_USER_REGS];
;  3601          3712  3          DBG$REG_SYMID = 0;
;  3602          3713  3          INCR I FROM 0 TO 16 DO
;  3603          3714  4              BEGIN
;  3604          3715  4              DBG$REG_VECTOR[.I] = 0;
;  3605          3716  4              DBG$REG_VALUES[.I] = .CURRENT_REG[.I];
;  3606          3717  3              END;
;  3607          3718  3
;  3608          3719  3          RETURN;
;  3609          3720  2          END;
;  3610          3721  2
;  3611          3722  2
;  3612          3723  2      ! We have a non-zero SYMID.  Make sure SYMID is of a valid kind.
;  3613          3724  2      !
;  3614          3725  2      IF (.SYMID[RST$B_KIND] EQL RST$K_TYPE)  OR
;  3615          3726  3         (.SYMID[RST$B_KIND] EQL RST$K_OVERLOAD)
;  3616          3727  2      THEN
;  3617          3728  2          $DBG_ERROR('RSTACCESS\SETCONTEXT');
;  3618          3729  2
;  3619          3730  2
;  3620          3731  2      ! Set the current context to "not established".  We do this by zeroing all
;  3621          3732  2      ! the register save location pointers in DBG$REG_VECTOR.  Also save the in-
;  3622          3733  2      ! put SYMID for later use in error messages.
;  3623          3734  2      !
;  3624          3735  2      INCR I FROM 0 TO 16 DO DBG$REG_VECTOR[.I] = 0;
;  3625          3736  2      DBG$REG_SYMID = .SYMID;
;  3626          3737  2
;  3627          3738  2
;  3628          3739  2      ! Find the RST entry of the inner-most routine containing the declaration
;  3629          3740  2      ! of the SYMID symbol.  If no such routine exists (because the symbol is
;  3630          3741  2      ! declared at the module level) return with no context set.  If the con-
;  3631          3742  2      ! text is a numeric scope (i.e., the context N levels down in the VAX call
```

```
;  3632          3743  2     ! stack), we simply set the SCOPE_IS_NUMERIC flag and pick up the value of
;  3633          3744  2     ! N from the module RST entry--this is how the context is set for register
;  3634          3745  2     ! symbols in a specified numeric scope.
;  3635          3746  2     !
;  3636          3747  2     SCOPE_IS_NUMERIC = FALSE;
;  3637          3748  2     ROUTPTR = .SYMID;
;  3638          3749  2     WHILE .ROUTPTR[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  3639          3750  3         BEGIN
;  3640          3751  3         IF .ROUTPTR[RST$B_KIND] EQL RST$K_MODULE
;  3641          3752  3         THEN
;  3642          3753  4             BEGIN
;  3643          3754  4             IF NOT .ROUTPTR[RST$V_MODNUMSCP] THEN RETURN;
;  3644          3755  4             SCOPE_IS_NUMERIC = TRUE;
;  3645          3756  4             INVOCNUM = .ROUTPTR[RST$L_MODSCPNUM];
;  3646          3757  4             STARTADDR = 0;
;  3647          3758  4             ENDADDR = %X'FFFFFFFF';
;  3648          3759  4             EXITLOOP;
;  3649          3760  3             END;
;  3650          3761  3
;  3651          3762  3         ROUTPTR = .ROUTPTR[RST$L_UPSCOPEPTR];
;  3652          3763  2         END;
;  3653          3764  2
;  3654          3765  2
;  3655          3766  2     ! If this is a regular routine scope (i.e., it is not a numeric scope for
;  3656          3767  2     ! a register reference), pick up the routine PC address range and determine
;  3657          3768  2     ! what the corresponding invocation number is (default is zero).
;  3658          3769  2     !
;  3659          3770  2     IF NOT .SCOPE_IS_NUMERIC
;  3660          3771  2     THEN
;  3661          3772  3         BEGIN
;  3662          3773  3         STARTADDR = .ROUTPTR[RST$L_STARTADDR];
;  3663          3774  3         ENDADDR = .ROUTPTR[RST$L_ENDADDR];
;  3664          3775  3         INVOCNUM = 0;
;  3665          3776  3         IF .SYMID[RST$V_INVOCNUM]
;  3666          3777  3         THEN
;  3667          3778  4             BEGIN
;  3668          3779  4             INVPTR = .SYMID[RST$L_SYMCHNPTR];
;  3669          3780  4             INVOCNUM = .INVPTR[RST$L_INVOCNUM];
;  3670          3781  3             END;
;  3671          3782  3
;  3672          3783  2         END;
;  3673          3784  2
;  3674          3785  2
;  3675          3786  2     ! Initialize the PC, the Frame Pointer, the scope number, and the register
;  3676          3787  2     ! values to their current (top of stack) values.
;  3677          3788  2     !
;  3678          3789  2     PCVAL = .DBG$RUNFRAME[DBG$L_USER_PC];
;  3679          3790  2     FRAMEPTR = .DBG$RUNFRAME[DBG$L_USER_FP];
;  3680          3791  2     SCOPE_NUMBER = 0;
;  3681          3792  2     CURRENT_REG = DBG$RUNFRAME[DBG$L_USER_REGS];
;  3682          3793  2     INCR I FROM 0 TO 16 DO
;  3683          3794  2         REGVEC[.I] = CURRENT_REG[.I];
;  3684          3795  2
;  3685          3796  2
;  3686          3797  2     ! Now search through the CALL frames on the VAX stack looking for the prop-
;  3687          3798  2     ! er invocation of the ROUTPTR routine or for the specified numeric scope.
;  3688          3799  2     ! Pick up all register save addresses in the stack along the way.
```

```
;  3689          3800  2     !
;  3690          3801  2     RUNFRAME_PTR = .DBG$RUNFRAME[DBG$L_NEXT_LINK];
;  3691          3802  2     INVOC_COUNT = 0;
;  3692          3803  2     WHILE TRUE DO
;  3693          3804  3         BEGIN
;  3694          3805  3
;  3695          3806  3
;  3696          3807  3         ! If we got to the bottom of the stack without finding the desired
;  3697          3808  3         ! invocation, return with the context not set.
;  3698          3809  3         !
;  3699          3810  4         IF (.PCVAL EQL 0) OR (.FRAMEPTR[SF$A_HANDLER] EQL DBG$FINAL_HANDL)
;  3700          3811  3         THEN
;  3701          3812  3             RETURN;
;  3702          3813  3
;  3703          3814  3
;  3704          3815  3         ! If this is a CALL frame of the routine we are looking for, increment
;  3705          3816  3         ! the invocation count.  When that reaches the desired invocation number
;  3706          3817  3         ! we have found the desired CALL frame and exit the loop.
;  3707          3818  3         !
;  3708          3819  4         IF (.PCVAL GEQU .STARTADDR) AND (.PCVAL LEQU .ENDADDR)
;  3709          3820  3         THEN
;  3710          3821  4             BEGIN
;  3711          3822  4
;  3712          3823  4
;  3713          3824  4             ! The PC from this CALL frame is in the address range of the routine
;  3714          3825  4             ! we are looking for.  However, to make sure the PC is not really in
;  3715          3826  4             ! a nested routine within the desired routine, we search the Module
;  3716          3827  4             ! SAT starting at the desired routine's SAT entry looking for nested
;  3717          3828  4             ! routines which cover the CALL frame's PC value.  If we find such a
;  3718          3829  4             ! routine, the CALL frame is not for the desired routine.
;  3719          3830  4             !
;  3720          3831  4             FRAME_FOUND_FLAG = TRUE;
;  3721          3832  4             SATPTR = 0;
;  3722          3833  4             IF NOT .SCOPE_IS_NUMERIC
;  3723          3834  4             THEN
;  3724          3835  5                 BEGIN
;  3725          3836  5                 SATPTR = .ROUTPTR[RST$L_RTNSATPTR];
;  3726          3837  5
;  3727          3838  5                 ! WARNING -- We can get into trouble here.  Previously, we have
;  3728          3839  5                 ! assumed that the SAT is always around.  This may not be the
;  3729          3840  5                 ! case if this module has been canceled.  There are times when
;  3730          3841  5                 ! the module could be canceled and then set again to make us
;  3731          3842  5                 ! believe the the SAT is valid for this RST, but it is not!  To
;  3732          3843  5                 ! correct the problem, when a module is canceled the field
;  3733          3844  5                 ! RST$L_RTNSATPTR is set to ZERO for each routine.
;  3734          3845  5                 ! So if the module for this RST has been canceled, SATPTR will
;  3735          3846  5                 ! be zero from the above statement. The problem is that this
;  3736          3847  5                 ! assumes there are no nested routines that truly require the
;  3737          3848  5                 ! correct context information.  This is, of course, WRONG.  A
;  3738          3849  5                 ! way of saving and getting to the SAT information must be
;  3739          3850  5                 ! found in the future.  B.A. Becker  MAY-1984
;  3740          3851  5                 !
;  3741          3852  5                 IF .SATPTR NEQ 0
;  3742          3853  5                 THEN
;  3743          3854  5                     SATPTR = .SATPTR[SAT$L_FLINK];
;  3744          3855  5
;  3745          3856  4                 END;
```

```
;  3746     3857  4
;  3747     3858  4                WHILE TRUE DO
;  3748     3859  5                    BEGIN
;  3749     3860  5
;  3750     3861  5                    ! If there are no more SAT entries in the chain or if they no
;  3751     3862  5                    ! longer cover the PCVAL address, exit the SAT loop.
;  3752     3863  5                    !
;  3753     3864  5                    IF .SATPTR EQL 0 THEN EXITLOOP;
;  3754     3865  5                    IF .SATPTR[SAT$L_START] GTRU .PCVAL THEN EXITLOOP;
;  3755     3866  5
;  3756     3867  5
;  3757     3868  5                    ! If this SAT entry is for a routine which covers the PCVAL
;  3758     3869  5                    ! address, we clear FRAME_FOUND_FLAG because the PC is in this
;  3759     3870  5                    ! nested routine instead of the routine we are looking for.
;  3760     3871  5                    !
;  3761     3872  5                    RSTPTR = .SATPTR[SAT$L_RSTPTR];
;  3762     3873  5                    IF (.PCVAL GEQU .SATPTR[SAT$L_START]) AND
;  3763     3874  5                       (.PCVAL LEQU .SATPTR[SAT$L_END])   AND
;  3764     3875  5                       (.RSTPTR[RST$B_KIND] EQL RST$K_ROUTINE)
;  3765     3876  6                    THEN
;  3766     3877  5                        BEGIN
;  3767     3878  6                        FRAME_FOUND_FLAG = FALSE;
;  3768     3879  6                        EXITLOOP;
;  3769     3880  6                        END;
;  3770     3881  5
;  3771     3882  5
;  3772     3883  5                    ! Link on to the next SAT entry.
;  3773     3884  5                    !
;  3774     3885  5                    SATPTR = .SATPTR[SAT$L_FLINK];
;  3775     3886  5                    END;
;  3776     3887  4
;  3777     3888  4
;  3778     3889  4                    ! If the CALL frame we found really is for the desired routine,
;  3779     3890  4                    ! check the invocation count.  If this is the desired invocation,
;  3780     3891  4                    ! exit the CALL stack loop.  Otherwise, increment the invocation
;  3781     3892  4                    ! count and keep looping.
;  3782     3893  4                    !
;  3783     3894  4                    IF .FRAME_FOUND_FLAG
;  3784     3895  4                    THEN
;  3785     3896  4                        BEGIN
;  3786     3897  5                        IF .INVOC_COUNT EQL .INVOCNUM THEN EXITLOOP;
;  3787     3898  5                        INVOC_COUNT = .INVOC_COUNT + 1;
;  3788     3899  5                        END;
;  3789     3900  4
;  3790     3901  4                    END;
;  3791     3902  4
;  3792     3903  4
;  3793     3904  4                ! We have not found the desired frame yet.  Dig out the register save
;  3794     3905  4                ! locations in this CALL frame and save those addresses in REGVEC.
;  3795     3906  4                !
;  3796     3907  4                GET_REGISTER_VALUES(.FRAMEPTR, RUNFRAME_PTR, REGVEC);
;  3797     3908  4
;  3798     3909  4
;  3799     3910  4                ! Determine what the value of SP (the Stack Pointer) is for the current
;  3800     3911  4                ! CALL frame and save that in the OWN variable SPVALUE.  Then make the
;  3801     3912  4                ! save-location pointer in REGVEC point to SPVALUE.  (Since SP does not
;  3802     3913  4
```

```
;  3803          3914  3          ! have a true save-location, the OWN variable fakes one.)
;  3804          3915  3          !
;  3805          3916  3          REGPTR = .REGVEC[14];
;  3806          3917  3          SPVALUE = .REGPTR[0];
;  3807          3918  3          REGVEC[14] = SPVALUE;
;  3808          3919  3
;  3809          3920  3
;  3810          3921  3          ! Dig out the values of PC and FP for the current CALL frame.  Then
;  3811          3922  3          ! increment the scope number and loop for the next stack frame.
;  3812          3923  3          !
;  3813          3924  3          REGPTR = .REGVEC[15];
;  3814          3925  3          PCVAL = .REGPTR[0];
;  3815          3926  3          REGPTR = .REGVEC[13];
;  3816          3927  3          FRAMEPTR = .REGPTR[0];
;  3817          3928  3          SCOPE_NUMBER = .SCOPE_NUMBER + 1;
;  3818          3929  2          END;
;  3819          3930  2
;  3820          3931  2
;  3821          3932  2      ! We have found the CALL frame and thus the context we wanted.  Set the
;  3822          3933  2      ! address of each register's save location in DBG$REG_VECTOR and the regis-
;  3823          3934  2      ! ter's value in DBG$REG_VALUES.  This makes the context available to the
;  3824          3935  2      ! value spec routines.  Then set the scope number in DBG$SCOPE_NUMBER and
;  3825          3936  2      ! return to the caller.
;  3826          3937  2      !
;  3827          3938  2      INCR I FROM 0 TO 16 DO
;  3828          3939  3          BEGIN
;  3829          3940  3          REGPTR = .REGVEC[.I];
;  3830          3941  3          DBG$REG_VECTOR[.I] = .REGPTR;
;  3831          3942  3          IF .REGPTR NEQ 0 THEN DBG$REG_VALUES[.I] = .REGPTR[0];
;  3832          3943  3          END;
;  3833          3944  2
;  3834          3945  2      DBG$REG_VALUES[16] = (.DBG$REG_VALUES[16] AND %X'0000FFFF') OR
;  3835          3946  2                           (.DBG$RUNFRAME[DBG$L_USER_PSL] AND %X'FFFF0000');
;  3836          3947  2      DBG$SCOPE_NUMBER = .SCOPE_NUMBER;
;  3837          3948  2      RETURN;
;  3838          3949  2
;  3839          3950  1      END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

43 54 45 53 5C 53 53 45 43 43 41 54 53 52 14  001C4 P.AAZ:  .ASCII  <20>\RSTACCESS\<92>\SETCONTEXT\                    ;
                              54 58 45 54 4E 4F  001D3                                                                ;

                                                        .PSECT  DBG$OWN,NOEXE,  PIC,2

                                                00050 SPVALUE:.BLKB   4


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                    0FFC 00000          .ENTRY  DBG$STA_SETCONTEXT, Save R2,R3,R4,R5,R6,R7,-; 3629
                                                                                R8,R9,R10,R11                           ;
                                          5E      AC   AE  9E 00002         MOVAB   -84(SP), SP                       ;
                                          6D    01A8   CF  DE 00006         MOVAL   22$, (FP)                         ; 3660
```

```
                          00000000'  EF   D4 0000B          CLRL    DBG$SCOPE_NUMBER                                    ; 3707
                              52     04   AC  D0 00011          MOVL    SYMID, R2                                           ; 3708
                                     24   12  00015          BNEQ    2$                                                  ;
                              54 00000000G 00   9E  00017          MOVAB   DBG$RUNFRAME+4, CURRENT_REG                 ; 3711
                          00000000'  EF   D4  0001E          CLRL    DBG$REG_SYMID                                       ; 3712
                                     50   D4  00024          CLRL    I                                                   ; 3716
                          00000000G0040   D4  00026 1$:      CLRL    DBG$REG_VECTOR[I]                                   ; 3715
                00000000G0040         6440 D0  0002D          MOVL    (CURRENT_REG)[I], DBG$REG_VALUES[I]                 ; 3716
                    EC        50       10  F3  00036          AOBLEQ  #16, I, T$                                          ; 3713
                                       04  00039          RET                                                         ; 3710
                              07   14   A2  91  0003B 2$:      CMPB    20(R2), #7                                          ; 3725
                                     06   13  0003F          BEQL    3$                                                  ;
                              0D   14   A2  91  00041          CMPB    20(R2), #13                                         ; 3726
                                     15   12  00045          BNEQ    4$                                                  ;
                          00000000'  EF   9F  00047 3$:      PUSHAB  P.AAZ                                               ; 3728
                                     01   DD  0004D          PUSHL   #1                                                  ;
                          00028362   8F   DD  0004F          PUSHL   #164706                                             ;
                00000000G  00        03   FB  00055          CALLS   #3, LIB$SIGNAL                                      ;
                                     50   D4  0005C 4$:      CLRL    I                                                   ; 3735
                          00000000G0040   D4  0005E 5$:      CLRL    DBG$REG_VECTOR[I]                                   ;
                    F5        50       10  F3  00065          AOBLEQ  #16, I, 5$                                          ;
                00000000'  EF            52  D0  00069          MOVL    R2, DBG$REG_SYMID                           ; 3736
                              04   AE     D4  00070          CLRL    SCOPE_IS_NUMERIC                                    ; 3747
                              53     52   D0  00073          MOVL    R2, ROUTPTR                                         ; 3748
                              02   14   A3  91  00076 6$:      CMPB    20(ROUTPTR), #2                                     ; 3749
                                     22   13  0007A          BEQL    9$                                                  ;
                              01   14   A3  91  0007C          CMPB    20(ROUTPTR), #1                                     ; 3751
                                     16   12  00080          BNEQ    8$                                                  ;
                    01        28   A3       03  E0  00082          BBS     #3, 40(ROUTPTR), 7$                         ; 3754
                                          04  00087          RET                                                         ;
                              04   AE          01  D0  00088 7$:      MOVL    #1, SCOPE_IS_NUMERIC                        ; 3755
                              5A         20   A3  D0  0008C          MOVL    32(ROUTPTR), INVOCNUM                       ; 3756
                                     5B   D4  00090          CLRL    STARTADDR                                           ; 3757
                              08   AE          01  CE  00092          MNEGL   #1, ENDADDR                                 ; 3758
                                     06   11  00096          BRB     9$                                                  ; 3753
                              53         10   A3  D0  00098 8$:      MOVL    16(ROUTPTR), ROUTPTR                        ; 3762
                                     D8   11  0009C          BRB     6$                                                  ; 3749
                              18         04   AE  E8  0009E 9$:      BLBS    SCOPE_IS_NUMERIC, 10$                       ; 3770
                              5B         18   A3  D0  000A2          MOVL    24(ROUTPTR), STARTADDR                      ; 3773
                              08   AE    1C   A3  D0  000A6          MOVL    28(ROUTPTR), ENDADDR                        ; 3774
                                     5A   D4  000AB          CLRL    INVOCNUM                                            ; 3775
                    08        15   A2       02  E1  000AD          BBC     #2, 21(R2), 10$                             ; 3776
                              50         08   A2  D0  000B2          MOVL    8(R2), INVPTR                               ; 3779
                              5A         18   A0  D0  000B6          MOVL    24(INVPTR), INVOCNUM                        ; 3780
                              55 00000000G    00  D0  000BA 10$:     MOVL    DBG$RUNFRAME+64, PCVAL                      ; 3789
                              57 00000000G    00  D0  000C1          MOVL    DBG$RUNFRAME+56, FRAMEPTR                   ; 3790
                                     6E   D4  000C8          CLRL    SCOPE_NUMBER                                        ; 3791
                              54 00000000G    00  9E  000CA          MOVAB   DBG$RUNFRAME+4, CURRENT_REG                 ; 3792
                                     50   D4  000D1          CLRL    I                                                   ; 3794
                        10 AE40         6440 DE  000D3 11$:     MOVAL   (CURRENT_REG)[I], REGVEC[I]                 ;
                    F6        50       10  F3  000D9          AOBLEQ  #16, I, T1$                                         ;
                              0C   AE 00000000G    00  D0  000DD          MOVL    DBG$RUNFRAME, RUNFRAME_PTR          ; 3801
                                     58   D4  000E5          CLRL    INVOC_COUNT                                         ; 3802
                                     55   D5  000E7 12$:     TSTL    PCVAL                                               ; 3810
                                     0A   13  000E9          BEQL    13$                                                 ;
                              50 00000000G    00  9E  000EB          MOVAB   DBG$FINAL_HANDL, R0                         ;
                              50             67  D1  000F2          CMPL    (FRAMEPTR), R0                              ;
```

```
                                01  12 000F5 13$:     BNEQ    14$                                                     ;
                                    04 000F7           RET                                                             ;
                5B                  55  D1 000F8 14$:  CMPL    PCVAL, STARTADDR                                        ; 3819
                                    42  1F 000FB       BLSSU   18$                                                     ;
            08  AE                  55  D1 000FD       CMPL    PCVAL, ENDADDR                                          ;
                                    3C  1A 00101       BGTRU   18$                                                     ;
                59                  01  D0 00103       MOVL    #1, FRAME_FOUND_FLAG                                    ; 3831
                                    52  D4 00106       CLRL    SATPTR                                                  ; 3832
                09      04          AE  E8 00108       BLBS    SCOPE_IS_NUMERIC, 16$                                   ; 3833
                52      20          A3  D0 0010C       MOVL    32(ROOTPTR), SATPTR                                     ; 3836
                                    23  13 00110       BEQL    17$                                                     ; 3852
                52                  62  D0 00112 15$:  MOVL    (SATPTR), SATPTR                                        ; 3854
                                    1E  13 00115 16$:  BEQL    17$                                                     ; 3865
                55          04      A2  D1 00117       CMPL    4(SATPTR), PCVAL                                        ; 3866
                                    18  1A 0011B       BGTRU   17$                                                     ;
                56          0C      A2  D0 0011D       MOVL    12(SATPTR), RSTPTR                                      ; 3873
            04  A2                  55  D1 00121       CMPL    PCVAL, 4(SATPTR)                                        ; 3874
                                    EB  1F 00125       BLSSU   15$                                                     ;
            08  A2                  55  D1 00127       CMPL    PCVAL, 8(SATPTR)                                        ; 3875
                                    E5  1A 0012B       BGTRU   15$                                                     ;
                02          14      A6  91 0012D       CMPB    20(RSTPTR), #2                                          ; 3876
                                    DF  12 00131       BNEQ    15$                                                     ;
                                    59  D4 00133       CLRL    FRAME_FOUND_FLAG                                        ; 3879
                07                  59  E9 00135 17$:  BLBC    FRAME_FOUND_FLAG, 18$                                   ; 3895
                5A                  58  D1 00138       CMPL    INVOC_COUNT, INVOCNUM                                   ; 3898
                                    35  13 0013B       BEQL    19$                                                     ;
                                    58  D6 0013D       INCL    INVOC_COUNT                                             ; 3899
                            10      AE  9F 0013F 18$:  PUSHAB  REGVEC                                                  ; 3908
                            10      AE  9F 00142       PUSHAB  RUNFRAME_PTR                                            ;
                                    57  DD 00145       PUSHL   FRAMEPTR                                                ;
                    0000V   CF          03  FB 00147       CALLS   #3, GET_REGISTER_VALUES                             ;
                                    54      48  AE  D0 0014C       MOVL    REGVEC+56, REGPTR                           ; 3916
                00000000'   EF          64  D0 00150       MOVL    (REGPTR), SPVALUE                                   ; 3917
                      48    AE  00000000' EF  9E 00157       MOVAB   SPVALUE, REGVEC+56                                  ; 3918
                                    54      4C  AE  D0 0015F       MOVL    REGVEC+60, REGPTR                           ; 3924
                                    55          64  D0 00163       MOVL    (REGPTR), PCVAL                             ; 3925
                                    54      44  AE  D0 00166       MOVL    REGVEC+52, REGPTR                           ; 3926
                                    57          64  D0 0016A       MOVL    (REGPTR), FRAMEPTR                          ; 3927
                                                6E  D6 0016D       INCL    SCOPE_NUMBER                                ; 3928
                                            FF75    31 0016F       BRW     12$                                         ; 3803
                                                50  D4 00172 19$:  CLRL    I                                           ; 3938
                                    54      10 AE40 D0 00174 20$:  MOVL    REGVEC[I], REGPTR                           ; 3940
                00000000G00040              54  D0 00179       MOVL    REGPTR, DBG$REG_VECTOR[I]                   ; 3941
                                                08  13 00181       BEQL    21$                                         ; 3942
                00000000G00040              64  D0 00183       MOVL    (REGPTR), DBG$REG_VALUES[I]                 ;
            E5                  50          10  F3 0018B 21$:  AOBLEQ  #16, I, 20$                                    ; 3938
            50  00000000G  00  0000FFFF    8F  CB 0018F       BICL3   #65535, DBG$RUNFRAME+68, R0                     ; 3946
                                51  00000000G  00  3C 0019B       MOVZWL  DBG$REG_VALUES+64, R1                       ;
00000000G   00                  50          51  C9 001A2       BISL3   R1, R0, DBG$REG_VALUES+64                   ;
                00000000'   EF              6E  D0 001AA       MOVL    SCOPE_NUMBER, DBG$SCOPE_NUMBER              ; 3947
                                                04 001B1       RET                                                 ; 3950
                                              0000 001B2 22$:  .WORD   Save nothing                                 ; 3660
                                            7E  D4 001B4       CLRL    -(SP)                                       ;
                                            5E  DD 001B6       PUSHL   SP                                          ;
                                7E          04  AC 7D 001B8       MOVQ    4(AP), -(SP)                            ;
                    0000V   CF              03  FB 001BC       CALLS   #3, SETCONTEXT_ERROR_HANDLER                ;
                                                04 001C1       RET                                                 ;
```

```
; Routine Size:  450 bytes,    Routine Base:  DBG$CODE + 178F
```

```
;  3841          3951  1 GLOBAL ROUTINE DBG$STA_SETREGISTERS: NOVALUE =
;  3842          3952  1 !
;  3843          3953  1 ! FUNCTION
;  3844          3954  1 !       This routine re-sets all register values in the current context (as
;  3845          3955  1 !       established by DBG$STA_SETCONTEXT) from the DBG$REG_VALUES vector.
;  3846          3956  1 !       This is done by copying each register's value from DBG$REG_VALUES to
;  3847          3957  1 !       the register save location in the VAX CALL stack (or in the Debugger's
;  3848          3958  1 !       save area for the top of stack register set).  The addresses of these
;  3849          3959  1 !       save locations is given by DBG$REG_VECTOR.  This routine must be called
;  3850          3960  1 !       at the end of each DEPOSIT command since this is the command which may
;  3851          3961  1 !       have changed the values of the registers in the current context.
;  3852          3962  1 !
;  3853          3963  1 !       As a side effect, this routine also clears the current context.  It is
;  3854          3964  1 !       thus necessary to call DBG$STA_SETCONTEXT again before evaluating more
;  3855          3965  1 !       value specs containing register references.
;  3856          3966  1 !
;  3857          3967  1 ! INPUTS
;  3858          3968  1 !       DBG$REG_VECTOR and DBG$REG_VALUES are the implicit inputs.  There are
;  3859          3969  1 !       no input parameters.
;  3860          3970  1 !
;  3861          3971  1 ! OUTPUTS
;  3862          3972  1 !       NONE
;  3863          3973  1 !
;  3864          3974  1
;  3865          3975  2     BEGIN
;  3866          3976  2
;  3867          3977  2     LOCAL
;  3868          3978  2         REGPTR: REF VECTOR[,LONG],      ! Pointer to register save location
;  3869          3979  2         PSWPTR: REF VECTOR[,WORD];      ! Pointer to PSW save location
;  3870          3980  2
;  3871          3981  2
;  3872          3982  2
;  3873          3983  2     ! Loop over the register set, re-setting all register values we can in the
;  3874          3984  2     ! current context.  Note that SP (R14) cannot be explicitly restored.
;  3875          3985  2     !
;  3876          3986  2     DBG$REG_VECTOR[14] = 0;
;  3877          3987  2     INCR I FROM 0 TO 15 DO
;  3878          3988  3         BEGIN
;  3879          3989  3         REGPTR = .DBG$REG_VECTOR[.I];
;  3880          3990  3         IF .REGPTR NEQ 0 THEN REGPTR[0] = .DBG$REG_VALUES[.I];
;  3881          3991  3         DBG$REG_VECTOR[.I] = 0;
;  3882          3992  2         END;
;  3883          3993  2
;  3884          3994  2
;  3885          3995  2     ! Also re-set the Processor Status Word (PSW) in its save location.
;  3886          3996  2     ! Then return.
;  3887          3997  2     !
;  3888          3998  2     PSWPTR = .DBG$REG_VECTOR[16];
;  3889          3999  2     IF .PSWPTR NEQ 0 THEN PSWPTR[0] = .DBG$REG_VALUES[16];
;  3890          4000  2     DBG$REG_VECTOR[16] = 0;
;  3891          4001  2     RETURN;
;  3892          4002  2
;  3893          4003  1     END;
```

```
                                 000C 00000          .ENTRY  DBG$STA_SETREGISTERS, Save R2,R3        ; 3951
                53 00000000G   00   9E 00002          MOVAB   DBG$REG_VECTOR+64, R3                   ;
                        F8     A3   D4 00009          CLRL    DBG$REG_VECTOR+56                       ; 3986
                               50   D4 0000C          CLRL    I                                       ; 3987
                51        C0 A340   DE 0000E 1$:      MOVAL   DBG$REG_VECTOR[I], R1                   ; 3989
                52               61   D0 00013          MOVL    (R1), REGPTR                           ;
                                 08   13 00016          BEQL    2$                                      ; 3990
                62 00000000G0040   D0 00018          MOVL    DBG$REG_VALUES[I], (REGPTR)             ;
                                 61   D4 00020 2$:      CLRL    (R1)                                    ; 3991
             E8                  50   0F F3 00022          AOBLEQ  #15, I, 1$                          ; 3987
                50               63   D0 00026          MOVL    DBG$REG_VECTOR+64, PSWPTR               ; 3998
                                 07   13 00029          BEQL    3$                                      ; 3999
                60 00000000G   00   B0 0002B          MOVW    DBG$REG_VALUES+64, (PSWPTR)             ;
                                 63   D4 00032 3$:      CLRL    DBG$REG_VECTOR+64                       ; 4000
                                      04 00034          RET                                             ; 4003

; Routine Size:  53 bytes,    Routine Base:  DBG$CODE + 1951
```

```
;  3895          4004  1 GLOBAL ROUTINE DBG$STA_SYM_IS_LITERAL (SYMID) =
;  3896          4005  1 !
;  3897          4006  1 ! FUNCTION
;  3898          4007  1 !       This routine accepts a symbol identifier and determines whether
;  3899          4008  1 !       the symbol represents a literal value. The same information can
;  3900          4009  1 !       be obtained by calling SYMVALUE, but that routine may have
;  3901          4010  1 !       side effects. This routine uses the same logic as SYMVALUE
;  3902          4011  1 !       and its subroutines VALSPEC and EVAL_MAT_SPEC, but does
;  3903          4012  1 !       not have the side effects associated with actually computing
;  3904          4013  1 !       the value.
;  3905          4014  1 !
;  3906          4015  1 ! INPUTS
;  3907          4016  1 !       SYMID   - A longword symbol identifier previously produced by routine
;  3908          4017  1 !                 DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.  SYMID uniquely ident-
;  3909          4018  1 !                 ifies the symbol whose "value" is to be returned.
;  3910          4019  1 !
;  3911          4020  1 ! OUTPUTS
;  3912          4021  1 !       The return value is one of:
;  3913          4022  1 !       TRUE    - The symbol does represent a literal
;  3914          4023  1 !       FALSE   - The symbol does not represent a literal
;  3915          4024  1 !
;  3916          4025  1
;  3917          4026  2     BEGIN
;  3918          4027  2
;  3919          4028  2     MAP
;  3920          4029  2         SYMID: REF RST$ENTRY;           ! Pointer to input symbol's RST entry
;  3921          4030  2
;  3922          4031  2     LOCAL
;  3923          4032  2         BLITRLR: REF DST$BLI_TRAILER1,  ! Pointer to Bliss DST record trailer
;  3924          4033  2         BLIVALSPEC: BLOCK[8,BYTE]       ! Value Spec buffer for Bliss special
;  3925          4034  2                 FIELD(DST$VS_HDR_FIELDS), !    cases DST record
;  3926          4035  2         DSTPTR: REF DST$RECORD,         ! Pointer to symbol's DST record
;  3927          4036  2         MSPTR: REF DST$MATER_SPEC,      ! Pointer to a Materialization Spec
;  3928          4037  2         VSPTR: REF DST$VAL_SPEC;        ! Pointer to a Value Spec
;  3929          4038  2
;  3930          4039  2
;  3931          4040  2
;  3932          4041  2     ! If the input symid is zero, return "false" for "does not represent
;  3933          4042  2     ! a literal". We need to check this here so we don't accvio later on
;  3934          4043  2     ! in the routine.
;  3935          4044  2     !
;  3936          4045  2     IF .SYMID EQL 0 THEN RETURN FALSE;
;  3937          4046  2
;  3938          4047  2
;  3939          4048  2     ! If the RST kind is not data, then the symbol is not a literal.
;  3940          4049  2     !
;  3941          4050  2     IF .SYMID[RST$B_KIND] NEQ RST$K_DATA
;  3942          4051  2     THEN
;  3943          4052  2         RETURN FALSE;
;  3944          4053  2
;  3945          4054  2
;  3946          4055  2     ! For RST records which are of kind data, obtain the DST record
;  3947          4056  2     ! which holds the value specification and act accordingly.
;  3948          4057  2     !
;  3949          4058  2     DSTPTR = .SYMID[RST$L_DSTPTR];
;  3950          4059  2     CASE .DSTPTR[DST$B_TYPE] FROM 0 TO 255 OF
;  3951          4060  2         SET
```

```
;  3952          4061  2
;  3953          4062  2
;  3954          4063  2          ! Handle all normal DST records, i.e. those of the standard format.
;  3955          4064  2          ! Obtain a pointer to the Value Spec.
;  3956          4065  2          !
;  3957          4066  2          [DSC$K_DTYPE_LOWEST TO DSC$K_DTYPE_HIGHEST,
;  3958          4067  2           DST$K_BOOL, DST$K_SEPTYP, DST$K_LBLORLIT,
;  3959          4068  2           DST$K_ENTRY, DST$R_RTNBEG, DST$R_BLKBEG,
;  3960          4069  2           DST$K_RECBEG, DST$R_ENUMELT]:
;  3961          4070  2              VSPTR = DSTPTR[DST$B_VFLAGS];
;  3962          4071  2
;  3963          4072  2
;  3964          4073  2          ! Handle the Bliss Special Cases DST record.  Construct a Value Spec
;  3965          4074  2          ! from the VFLAGS and VALUE fields in the record (which are not adjacent
;  3966          4075  2          ! in this particular record).
;  3967          4076  2          !
;  3968          4077  2          [DST$K_BLI]:
;  3969          4078  2              BEGIN
;  3970          4079  2              BLIVALSPEC[DST$B_VS_VFLAGS] = .DSTPTR[DST$B_BLI_VFLAGS];
;  3971          4080  2              BLITRLR = DSTPTR[DST$A_BLI_TRLRI] + .DSTPTR[DST$B_BLI_LNG];
;  3972          4081  2              BLIVALSPEC[DST$L_VS_VALUE] = .BLITRLR[DST$L_BLI_VALUE];
;  3973          4082  2              VSPTR = BLIVALSPEC;
;  3974          4083  2
;  3975          4084  2              ! See the corresponding hack in DBG$STA_SYMVALUE.
;  3976          4085  2              !
;  3977          4086  2              IF .VSPTR[DST$V_VS_VALKIND] EQL DST$K_VALKIND_LITERAL
;  3978          4087  2              THEN
;  3979          4088  2                  VSPTR[DST$V_VS_VALKIND] = DST$K_VALKIND_ADDR;
;  3980          4089  2              END;
;  3981          4090  2
;  3982          4091  2
;  3983          4092  2              ! BLISS fields. Return TRUE - these are literal values.
;  3984          4093  2              !
;  3985          4094  2              [DST$K_BLIFLD]:
;  3986          4095  2                  RETURN TRUE;
;  3987          4096  2
;  3988          4097  2              ! Any other DST record does not represent a literal.
;  3989          4098  2              !
;  3990          4099  2              [INRANGE]:
;  3991          4100  2                  RETURN FALSE;
;  3992          4101  2
;  3993          4102  2              TES;
;  3994          4103  2
;  3995          4104  2
;  3996          4105  2          ! If we fall through to here, VSPTR points to a Value Spec.
;  3997          4106  2          ! If the value is given by a trailing Value Spec, we get to that Value
;  3998          4107  2          ! Spec.  We loop in case the indirection is repeated.
;  3999          4108  2          !
;  4000          4109  2          WHILE .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_TVS DO
;  4001          4110  2              VSPTR = VSPTR[DST$A_VS_TVS_BASE] + .VSPTR[DST$L_VS_TVS_OFFSET];
;  4002          4111  2
;  4003          4112  2
;  4004          4113  2          ! If the Value Spec gives the offset to a descriptor (in the DST),
;  4005          4114  2          ! or the Value Spec is a Bit Offset Value Spec, then it does not
;  4006          4115  2          ! represent a literal.
;  4007          4116  2          !
;  4008          4117  2          IF .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_DSC
```

```
;  4009          4118  2     OR .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_BITOFFS
;  4010          4119  2     THEN
;  4011          4120  2         RETURN FALSE;
;  4012          4121  2
;  4013          4122  2
;  4014          4123  2     ! If this is a Value-Spec-Follows value spec, a more complex value spec
;  4015          4124  2     ! follows the VFLAGS field.
;  4016          4125  2     !
;  4017          4126  2     IF .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VS_FOLLOWS
;  4018          4127  2     THEN
;  4019          4128  2         BEGIN
;  4020          4129  2
;  4021          4130  2
;  4022          4131  2         ! If the object is not statically allocated, then it is not a literal.
;  4023          4132  2         !
;  4024          4133  2         IF .VSPTR[DST$B_VS_ALLOC] NEQ DST$K_VS_ALLOC_STAT
;  4025          4134  2         THEN
;  4026          4135  2             RETURN FALSE;
;  4027          4136  2
;  4028          4137  2         ! If we get here, the object is statically allocated.
;  4029          4138  2         ! Obtain the Materialization Spec.
;  4030          4139  2         !
;  4031          4140  2         MSPTR  = VSPTR[DST$A_VS_MATSPEC];
;  4032          4141  2
;  4033          4142  2
;  4034          4143  2         ! If the Materialization Spec is of kind "R-Value", then
;  4035          4144  2         ! it is a literal.
;  4036          4145  2         !
;  4037          4146  2         IF .MSPTR[DST$B_MS_KIND] EQL DST$K_MS_RVAL
;  4038          4147  2         THEN
;  4039          4148  2             RETURN TRUE
;  4040          4149  3
;  4041          4150  3         ELSE
;  4042          4151  3             RETURN FALSE;
;  4043          4152  2         END;
;  4044          4153  2
;  4045          4154  2
;  4046          4155  2     ! If we fall through to here, we have an ordinary garden-variety
;  4047          4156  2     ! Value Spec. If it is a literal, return true.
;  4048          4157  2     !
;  4049          4158  2     IF .VSPTR[DST$V_VS_VALKIND] EQL DST$K_VALKIND_LITERAL
;  4050          4159  2     THEN
;  4051          4160  2         RETURN TRUE
;  4052          4161  2
;  4053          4162  2     ELSE
;  4054          4163  2         RETURN FALSE;
;  4055          4164  1     END;


                                0004 00000          .ENTRY  DBG$STA_SYM_IS_LITERAL, Save R2                 ;  4004
                             5E      08   C2 00002          SUBL2   #8, SP                                  ;
                             50  04  AC   D0 00005          MOVL    SYMID, R0                               ;  4045
                                     03   12 00009          BNEQ    2$                                      ;
                                 026F    31 0000B 1$:       BRW     11$                                     ;
```

```
                                06      14    A0  91 0000E 2$:     CMPB    20(R0), #6                      ; 4050
                                        F7    12 00012          BNEQ    1$                              ;
                                50      0C    A0  D0 00014          MOVL    12(R0), DSTPTR                  ; 4058
                          FF    8F      00    01    A0  8F 00018          CASEB   1(DSTPTR), #0, #255     ; 4059
                0200            0200            0206      0001E 3$:     .WORD   5$-3$,-                 ;
                0200            0200            0200      00026         .WORD   4$-3$,-                 ;
                0200            0200            0200      0002E         .WORD   4$-3$,-                 ;
                0200            0200            0200      00036         .WORD   4$-3$,-                 ;
                0200            0200            0200      0003E         .WORD   4$-3$,-                 ;
                0200            0200            0200      00046         .WORD   4$-3$,-                 ;
                0200            0200            0200      0004E         .WORD   4$-3$,-                 ;
                0200            0200            0200      00056         .WORD   4$-3$,-                 ;
                0200            0200            0200      0005E         .WORD   4$-3$,-                 ;
                025F            025F            0200      00066         .WORD   4$-3$,-                 ;
                025F            025F            025F      0006E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00076         .WORD   4$-3$,-                 ;
                025F            025F            025F      0007E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00086         .WORD   4$-3$,-                 ;
                025F            025F            025F      0008E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00096         .WORD   4$-3$,-                 ;
                025F            025F            025F      0009E         .WORD   4$-3$,-                 ;
                025F            025F            025F      000A6         .WORD   4$-3$,-                 ;
                025F            025F            025F      000AE         .WORD   4$-3$,-                 ;
                025F            025F            025F      000B6         .WORD   4$-3$,-                 ;
                025F            025F            025F      000BE         .WORD   4$-3$,-                 ;
                025F            025F            025F      000C6         .WORD   4$-3$,-                 ;
                025F            025F            025F      000CE         .WORD   4$-3$,-                 ;
                025F            025F            025F      000D6         .WORD   4$-3$,-                 ;
                025F            025F            025F      000DE         .WORD   4$-3$,-                 ;
                025F            025F            025F      000E6         .WORD   4$-3$,-                 ;
                025F            025F            025F      000EE         .WORD   4$-3$,-                 ;
                025F            025F            025F      000F6         .WORD   4$-3$,-                 ;
                025F            025F            025F      000FE         .WORD   4$-3$,-                 ;
                025F            025F            025F      00106         .WORD   4$-3$,-                 ;
                025F            025F            025F      0010E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00116         .WORD   4$-3$,-                 ;
                025F            025F            025F      0011E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00126         .WORD   4$-3$,-                 ;
                025F            025F            025F      0012E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00136         .WORD   4$-3$,-                 ;
                025F            025F            025F      0013E         .WORD   4$-3$,-                 ;
                025F            025F            025F      00146         .WORD   4$-3$,-                 ;
                025F            025F            025F      0014E         .WORD   11$-3$,-                ;
                025F            0200            025F      00156         .WORD   11$-3$,-                ;
                0200            025F            025F      0015E         .WORD   11$-3$,-                ;
                025F            025F            025F      0200          .WORD   11$-3$,-                ;
                0200            025F            025F      00166         .WORD   11$-3$,-                ;
                025F            025F            025F      0016E         .WORD   11$-3$,-                ;
                025F            025F            025F      00176         .WORD   11$-3$,-                ;
                025F            025F            025F      0200          .WORD   11$-3$,-                ;
                025B            025F            0200      00186         .WORD   11$-3$,-                ;
                025F            0200            025F      0018E         .WORD   11$-3$,-                ;
                025F            0200            025F      00196         .WORD   11$-3$,-                ;
                025F            025F            025F      0019E         .WORD   11$-3$,-                ;
                025F            025F            025F      001A6         .WORD   11$-3$,-                ;
                025F            025F            025F      001AE         .WORD   11$-3$,-                ;
                025F            025F            025F      001B6         .WORD   11$-3$,-                ;
                025F            025F            025F      001BE         .WORD   11$-3$,-                ;
```

```
        025F        025F        025F        025F   001C6        11$-3$,-                          ;
        025F        025F        025F        025F   001CE        11$-3$,-                          ;
        025F        025F        025F        025F   001D6        11$-3$,-                          ;
        025F        025F        025F        025F   001DE        11$-3$,-                          ;
        025F        025F        025F        025F   001E6        11$-3$,-                          ;
        025F        025F        025F        025F   001EE        11$-3$,-                          ;
        025F        025F        025F        025F   001F6        11$-3$,-                          ;
        025F        025F        025F        025F   001FE        11$-3$,-                          ;
        025F        025F        025F        025F   00206        11$-3$,-                          ;
        025F        025F        025F        025F   0020E        11$-3$,-                          ;
        025F        025F        025F        025F   00216        11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
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                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
                                                                11$-3$,-                          ;
```

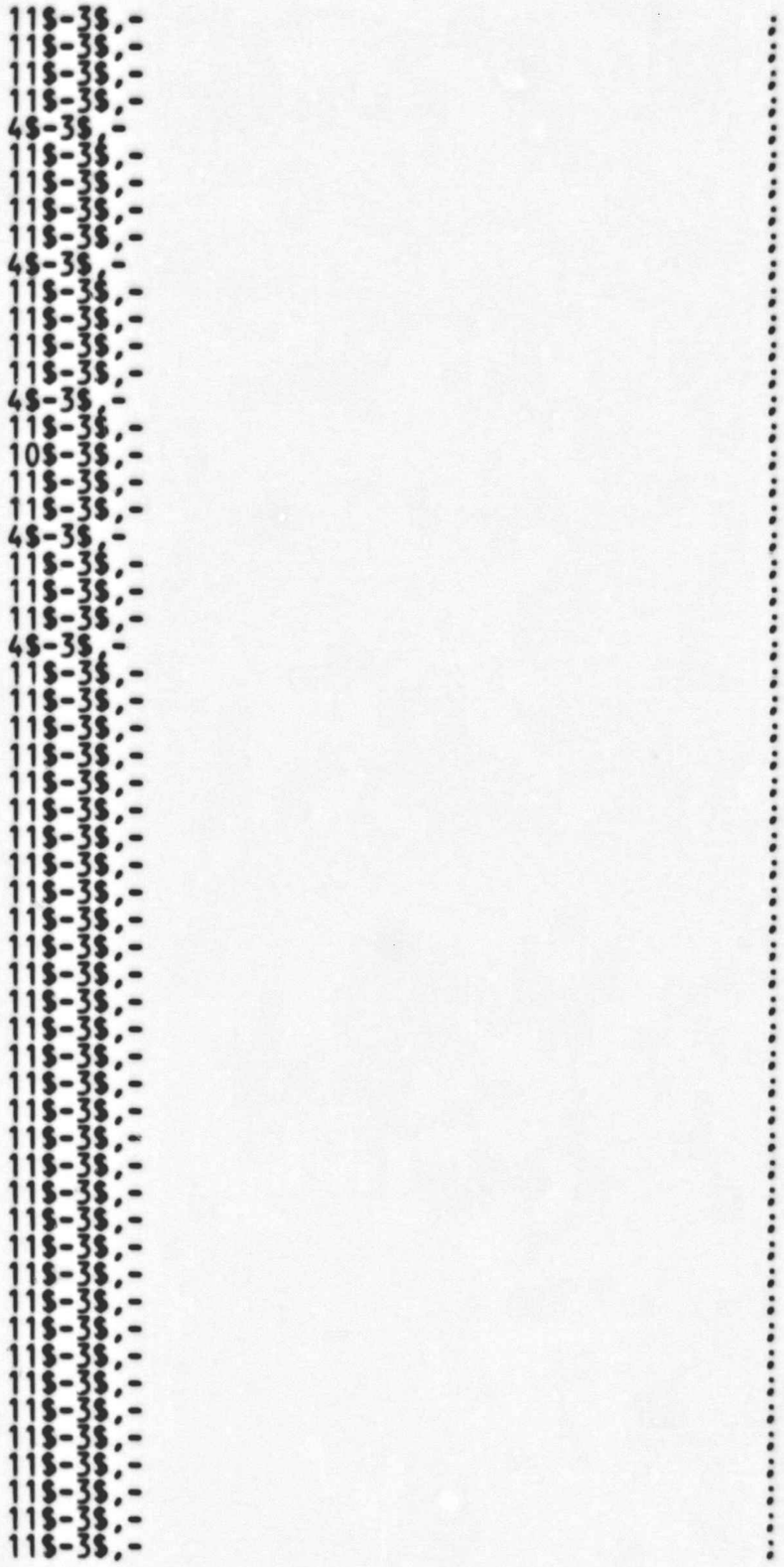

```
                                                                        11$-3$,-                          ;
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                                                                        11$-3$,-                          ;
                                                                        11$-3$,-                          ;
                                                                        11$-3$,-                          ;
                                                                        11$-3$,-                          ;
                                                                        11$-3$,-                          ;
                                                                        11$-3$                            ;
                          51        02  A0   9E 0021E 4$:   MOVAB    2(R0), VSPTR                     ; 4070
                                        1E   11 00222       BRB      6$                               ;
                          6E        04  A0   90 00224 5$:   MOVB     4(DSTPTR), BLIVALSPEC            ; 4079
                          52        02  A0   9A 00228       MOVZBL   2(DSTPTR), R2                    ; 4080
                          50        03 A240  9E 0022C       MOVAB    3(R2)[DSTPTR], BLITRLR           ;
                     01   AE            60   D0 00231       MOVL     (BLITRLR), BLIVALSPEC+1          ; 4081
                          51            6E   9E 00235       MOVAB    BLIVALSPEC, VSPTR                ; 4082
                          03            61   93 00238       BITB     (VSPTR), #3                      ; 4086
                                        05   12 0023B       BNEQ     6$                               ;
      61          02      00            01   F0 0023D       INSV     #1, #0, #2, (VSPTR)              ; 4088
                     FB   8F            61   91 00242 6$:   CMPB     (VSPTR), #251                    ; 4109
                                        0B   12 00246       BNEQ     7$                               ;
                  50      51        01  A1   C1 00248       ADDL3    1(VSPTR), VSPTR, R0              ; 4110
                          51        05  A0   9E 0024D       MOVAB    5(R0), VSPTR                     ;
                                        EF   11 00251       BRB      6$                               ;
                     FA   8F            61   91 00253 7$:   CMPB     (VSPTR), #250                    ; 4117
                                        24   13 00257       BEQL     11$                              ;
                     FF   8F            61   91 00259       CMPB     (VSPTR), #255                    ; 4118
                                        1E   13 0025D       BEQL     11$                              ;
                     FD   8F            61   91 0025F       CMPB     (VSPTR), #253                    ; 4126
                                        0F   12 00263       BNEQ     8$                               ;
                          01        03  A1   91 00265       CMPB     3(VSPTR), #1                     ; 4133
                                        12   12 00269       BNEQ     11$                              ;
                          50        04  A1   9E 0026B       MOVAB    4(R1), MSPTR                     ; 4140
                          04            60   91 0026F       CMPB     (MSPTR), #4                      ; 4146
```

```
                     03  11 00272              BRB     9$                                      ;
                 03  61  93 00274 8$:          BITB    (VSPTR), #3                             ; 4158
                     04  12 00277 9$:          BNEQ    11$                                     ;
                 50  01  D0 00279 10$:         MOVL    #1, R0                                  ; 4163
                     04  00027C                RET                                             ;
                     50  D4 00027D 11$:         CLRL    R0                                      ; 4164
                     04  00027F                RET                                             ;

; Routine Size:  640 bytes,    Routine Base:  DBG$CODE + 1986
```

```
;  4057          4165  1 GLOBAL ROUTINE DBG$STA_SYMKIND(SYMID, KIND): NOVALUE =
;  4058          4166  1 !
;  4059          4167  1 ! FUNCTION
;  4060          4168  1 !       This routine returns the "kind" of a specified symbol.  The symbol is
;  4061          4169  1 !       represented by a symbol identifier as produced by DBG$STA_GETSYMBOL or
;  4062          4170  1 !       DBG$STA_GETSYMOFF.  The returned "kind" is the same kind as originally
;  4063          4171  1 !       produced by those two routines.
;  4064          4172  1 !
;  4065          4173  1 ! INPUTS
;  4066          4174  1 !       SYMID   - A longword symbol identifier previously produced by routine
;  4067          4175  1 !                 DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.  SYMID uniquely ident-
;  4068          4176  1 !                 ifies the symbol whose kind is to be returned.
;  4069          4177  1 !
;  4070          4178  1 !       KIND    - The address of a longword location where the symbol's kind
;  4071          4179  1 !                 code should be returned.
;  4072          4180  1 !
;  4073          4181  1 ! OUTPUTS
;  4074          4182  1 !       KIND    - The "kind" of the SYMID symbol is returned to KIND.  This is
;  4075          4183  1 !                 a small integer with the following possible values:
;  4076          4184  1 !
;  4077          4185  1 !                       RST$K_MODULE    -- SYMID is a Module
;  4078          4186  1 !                       RST$K_ROUTINE   -- SYMID is a Routine
;  4079          4187  1 !                       RST$K_BLOCK     -- SYMID is a Block
;  4080          4188  1 !                       RST$K_ENTRY     -- SYMID is an Entry Point
;  4081          4189  1 !                       RST$K_LABEL     -- SYMID is a Label
;  4082          4190  1 !                       RST$K_LINE      -- SYMID is a Line
;  4083          4191  1 !                       RST$K_DATA      -- SYMID is a Data Item
;  4084          4192  1 !                       RST$K_TYPE      -- SYMID is a Data Type
;  4085          4193  1 !
;  4086          4194  1 !       No value is returned by DBG$STA_SYMKIND.
;  4087          4195  1 !
;  4088          4196  1
;  4089          4197  2     BEGIN
;  4090          4198  2
;  4091          4199  2     MAP
;  4092          4200  2         SYMID: REF RST$ENTRY,           ! Pointer to the RST entry whose "kind"
;  4093          4201  2                                         !       is to be returned.
;  4094          4202  2         KIND: REF VECTOR[1];            ! Pointer to the location where the
;  4095          4203  2                                         !       kind is to be returned.
;  4096          4204  2
;  4097          4205  2
;  4098          4206  2
;  4099          4207  2     ! Make sure SYMID points to a valid RST entry (or at least seems to).  Then
;  4100          4208  2     ! copy the entry's kind to KIND and return.
;  4101          4209  2     !
;  4102          4210  2     IF .SYMID[RST$B_KIND] LEQ RST$K_KIND_MINIMUM OR
;  4103          4211  2        .SYMID[RST$B_KIND] GTR RST$K_KIND_MAXIMUM
;  4104          4212  2     THEN
;  4105          4213  2         $DBG_ERROR('RSTACCESS\SYMKIND');
;  4106          4214  2
;  4107          4215  2     KIND[0] = .SYMID[RST$B_KIND];
;  4108          4216  2     RETURN;
;  4109          4217  2
;  4110          4218  1     END;
```

```
                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

4B 4D 59 53 5C 53 53 45 43 43 41 54 53 52 11  001D9 P.ABA:   .ASCII  <17>\RSTACCESS\<92>\SYMKIND\                ;
                                        44 4E 49  001E8                                                         ;


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                           0004 00000           .ENTRY  DBG$STA_SYMKIND, Save R2                ; 4165
                                50      04   AC   D0 00002      MOVL    SYMID, R0                               ; 4210
                                52      14   A0   9A 00006      MOVZBL  20(R0), R2                              ;
                                             05   15 0000A      BLEQ    1$                                      ;
                                0D           52   91 0000C      CMPB    R2, #13                                 ; 4211
                                             15   1B 0000F      BLEQU   2$                                      ;
                                00000000'    EF   9F 00011 1$:  PUSHAB  P.ABA                                   ; 4213
                                             01   DD 00017      PUSHL   #1                                      ;
                                00028362     8F   DD 00019      PUSHL   #164706                                 ;
                        00000000G   00       03   FB 0001F      CALLS   #3, LIB$SIGNAL                          ;
                              08    BC       52   D0 00026 2$:  MOVL    R2, @KIND                               ; 4215
                                             04   0002A         RET                                             ; 4218

; Routine Size:  43 bytes,    Routine Base:  DBG$CODE + 1C06
```

```
;  4112          4219  1 GLOBAL ROUTINE DBG$STA_SYMNAME(SYMID, NAMEPTR): NOVALUE =
;  4113          4220  1 !
;  4114          4221  1 ! FUNCTION:
;  4115          4222  1 !       This routine accepts a symbol identifier and returns the corresponding
;  4116          4223  1 !       symbol's name without any qualification.  The symbol identifier is the
;  4117          4224  1 !       unique identifier produced by DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.
;  4118          4225  1 !       The returned symbol name is represented as a counted ASCII string.
;  4119          4226  1 !
;  4120          4227  1 !       Since this routine does not produce a completely qualified, unambiguous
;  4121          4228  1 !       name, it is primarily used to get the names of data record components.
;  4122          4229  1 !       Such component names are needed by language-specific routines when
;  4123          4230  1 !       printing the values of data records.
;  4124          4231  1 !
;  4125          4232  1 ! INPUTS:
;  4126          4233  1 !       SYMID   - A longword symbol identifier previously produced by routine
;  4127          4234  1 !                 DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.  SYMID uniquely ident-
;  4128          4235  1 !                 ifies the symbol whose name is to be returned.
;  4129          4236  1 !
;  4130          4237  1 !       NAMEPTR - The address of a longword location where a pointer to the
;  4131          4238  1 !                 symbol's name should be returned.
;  4132          4239  1 !
;  4133          4240  1 ! OUTPUTS:
;  4134          4241  1 !       NAMEPTR - A pointer to the counted ASCII string giving the symbol's
;  4135          4242  1 !                 bottom level, unqualified name is returned to NAMEPTR.
;  4136          4243  1 !
;  4137          4244  1 !       No value is returned by DBG$STA_SYMNAME.
;  4138          4245  1 !
;  4139          4246  1
;  4140          4247  2     BEGIN
;  4141          4248  2
;  4142          4249  2     MAP
;  4143          4250  2         SYMID: REF RST$ENTRY,           ! Pointer to the RST entry whose name
;  4144          4251  2                                         !     string is to be returned.
;  4145          4252  2         NAMEPTR: REF VECTOR[1];         ! Pointer to the location where the
;  4146          4253  2                                         !     string address is to be returned.
;  4147          4254  2
;  4148          4255  2
;  4149          4256  2
;  4150          4257  2     ! Make sure SYMID seems to point to a valid RST entry.  Copy the address
;  4151          4258  2     ! of the name string to NAMEPTR by calling GET_DST_NAME.  Then return.
;  4152          4259  2     !
;  4153          4260  2     IF .SYMID[RST$B_KIND] LSS RST$K_KIND_MINIMUM OR
;  4154          4261  2        .SYMID[RST$B_KIND] GTR RST$K_KIND_MAXIMUM
;  4155          4262  2     THEN
;  4156          4263  2         $DBG_ERROR('RSTACCESS\SYMNAME');
;  4157          4264  2
;  4158          4265  2     NAMEPTR[0] = DBG$GET_DST_NAME(.SYMID[RST$L_DSTPTR]);
;  4159          4266  2     RETURN;
;  4160          4267  2
;  4161          4268  1     END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

4E  4D  59  53  5C  53  53  45  43  43  41  54  53  52  11  001EB P.ABB:  .ASCII  <17>\RSTACCESS\<92>\SYMNAME\                ;
                                                    45  4D  41  001FA                                                       ;
```

```
                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                0004 00000      .ENTRY  DBG$STA_SYMNAME, Save R2                ; 4219
                          52        04    AC    D0 00002      MOVL    SYMID, R2                               ; 4261
                          0D        14    A2    91 00006      CMPB    20(R2), #13                             ;
                                          15    1B 0000A      BLEQU   1$                                      ;
                              00000000'   EF    9F 0000C      PUSHAB  P.ABB                                   ; 4263
                                          01    DD 00012      PUSHL   #1                                      ;
                              00028362    8F    DD 00014      PUSHL   #164706                                 ;
                00000000G     00          03    FB 0001A      CALLS   #3, LIB$SIGNAL                          ;
                                    0C    A2    DD 00021 1$:  PUSHL   12(R2)                                  ; 4265
                00000000G     00          01    FB 00024      CALLS   #1, DBG$GET_DST_NAME                    ;
                      08      BC          50    D0 0002B      MOVL    R0, @NAMEPTR                            ;
                                          04    0002F         RET                                             ; 4268

; Routine Size:  48 bytes,    Routine Base:  DBG$CODE + 1C31
```

```
;  4163          4269  1 GLOBAL ROUTINE DBG$STA_SYMPARENT(SYMID) =
;  4164          4270  1 !
;  4165          4271  1 ! FUNCTION
;  4166          4272  1 !       This routine returns the parent data item of a record (structure) compo-
;  4167          4273  1 !       nent.  Thus, if there is a data item A.B(2).C, then the parent of C is
;  4168          4274  1 !       B and the parent of B is A.  A does not have any parent.  This routine
;  4169          4275  1 !       should only be called when the data component has been looked up direct-
;  4170          4276  1 !       ly in the RST via DBG$STA_GETSYMBOL, as would be done in languages like
;  4171          4277  1 !       PL/I or Cobol where record qualification need not be explicitly stated.
;  4172          4278  1 !
;  4173          4279  1 ! INPUTS
;  4174          4280  1 !       SYMID   - The SYMID returned by DBG$STA_GETSYMBOL for the data item
;  4175          4281  1 !                 whose parent data item is to be found.  This symbol must
;  4176          4282  1 !                 be of kind RST$K_DATA.
;  4177          4283  1 !
;  4178          4284  1 ! OUTPUTS
;  4179          4285  1 !       The SYMID of the input symbol's parent symbol is returned as the routine
;  4180          4286  1 !                 value.  If the input symbol does not have a parent, i.e. if
;  4181          4287  1 !                 the input symbol is not a record component but a separate data
;  4182          4288  1 !                 item in its own right, zero is returned as the routine value.
;  4183          4289  1 !
;  4184          4290  1
;  4185          4291  2     BEGIN
;  4186          4292  2
;  4187          4293  2     MAP
;  4188          4294  2         SYMID: REF RST$ENTRY;           ! Pointer to input symbol's RST entry
;  4189          4295  2
;  4190          4296  2     LOCAL
;  4191          4297  2         RSTPTR: REF RST$ENTRY;          ! Pointer to the first up-scope symbol
;  4192          4298  2                                         !      --this may be the parent symbol
;  4193          4299  2
;  4194          4300  2
;  4195          4301  2
;  4196          4302  2     ! Make sure the input parameter is the SYMID of a Data Item RST Entry.
;  4197          4303  2     !
;  4198          4304  2     IF .SYMID[RST$B_KIND] NEQ RST$K_DATA
;  4199          4305  2     THEN
;  4200          4306  2         $DBG_ERROR('RSTACCESS\SYMPARENT');
;  4201          4307  2
;  4202          4308  2
;  4203          4309  2     ! Get the first RST entry up-scope from the input symbol.  If this is a Data
;  4204          4310  2     ! Item RST Entry, return its SYMID as the routine value.  Otherwise, return
;  4205          4311  2     ! a zero as the routine value.
;  4206          4312  2     !
;  4207          4313  2     RSTPTR = .SYMID[RST$L_UPSCOPEPTR];
;  4208          4314  2     IF .RSTPTR[RST$B_KIND] EQL RST$K_DATA THEN RETURN .RSTPTR;
;  4209          4315  2     RETURN 0;
;  4210          4316  2
;  4211          4317  1     END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

50  4D  59  53  5C  53  53  45  43  43  41  54  53  52  13  001FD P.ABC:  .ASCII  <19>\RSTACCESS\<92>\SYMPARENT\                ;
                                        54  4E  45  52  41  0020C                                                           ;
```

```
                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                        0004 00000      .ENTRY  DBG$STA_SYMPARENT, Save R2                       ; 4269
                                    52        04    AC  D0 00002      MOVL    SYMID, R2                                       ; 4304
                                    06        14    A2  91 00006      CMPB    20(R2), #6                                      ;
                                                    15  13 0000A      BEQL    1$                                              ;
                                        00000000'   EF  9F 0000C      PUSHAB  P.ABC                                           ; 4306
                                                    01  DD 00012      PUSHL   #1                                              ;
                                        00028362    8F  DD 00014      PUSHL   #164706                                         ;
                            00000000G   00          03  FB 0001A      CALLS   #3, LIB$SIGNAL                                  ;
                                    50        10    A2  D0 00021  1$:   MOVL    16(R2), RSTPTR                              ; 4313
                                    06        14    A0  91 00025      CMPB    20(RSTPTR), #6                                  ; 4314
                                                    02  13 00029      BEQL    2$                                              ;
                                                    50  D4 0002B      CLRL    R0                                              ; 4315
                                                        04 0002D  2$:   RET                                                     ; 4317

; Routine Size:  46 bytes,    Routine Base:  DBG$CODE + 1C61
```

```
;  4213          4318  1 GLOBAL ROUTINE DBG$STA_SYMPATHNAME(SYMID, PATHNAME): NOVALUE =
;  4214          4319  1 !
;  4215          4320  1 ! FUNCTION
;  4216          4321  1 !       This routine accepts a symbol identifier and returns the corresponding
;  4217          4322  1 !       symbol's fully qualified pathname.  The symbol identifier is the unique
;  4218          4323  1 !       identifier produced by the DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF rou-
;  4219          4324  1 !       tine.  The returned pathname is represented in internal format by a
;  4220          4325  1 !       pathname descriptor which includes the symbol name with all possible
;  4221          4326  1 !       pathname qualification and all possible data record qualification.  This
;  4222          4327  1 !       does not include array subscripts, however.
;  4223          4328  1 !
;  4224          4329  1 !       This routine is called when a symbol's name is to be printed in a com-
;  4225          4330  1 !       pletely unambiguous form.  The returned pathname is not in a directly
;  4226          4331  1 !       printable form, but can relatively easily be converted to a character
;  4227          4332  1 !       string by language-specific routines.
;  4228          4333  1 !
;  4229          4334  1 ! INPUTS
;  4230          4335  1 !       SYMID   - A longword symbol identifier previously produced by routine
;  4231          4336  1 !                 DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.  SYMID uniquely ident-
;  4232          4337  1 !                 ifies the symbol whose complete pathname is to be returned.
;  4233          4338  1 !
;  4234          4339  1 !       PATHNAME - The address of a longword location where a pointer to the
;  4235          4340  1 !                  symbol's pathname descriptor should be returned.
;  4236          4341  1 !
;  4237          4342  1 ! OUTPUTS
;  4238          4343  1 !       PATHNAME - A full pathname descriptor for the SYMID symbol is generated
;  4239          4344  1 !                  and a pointer to that descriptor is returned to PATHNAME.  The
;  4240          4345  1 !                  descriptor will disappear after the processing of the current
;  4241          4346  1 !                  DEBUG command.
;  4242          4347  1 !
;  4243          4348  1 !       No value is returned by DBG$STA_SYMPATHNAME.
;  4244          4349  1 !
;  4245          4350  1
;  4246          4351  2     BEGIN
;  4247          4352  2
;  4248          4353  2     MAP
;  4249          4354  2         SYMID: REF RST$ENTRY,                   ! Pointer to input RST entry
;  4250          4355  2         PATHNAME: REF VECTOR[1];                ! Pointer to returned pathname descr.
;  4251          4356  2
;  4252          4357  2     LOCAL
;  4253          4358  2         COMPCNT,                                ! Number of data components in pathname
;  4254          4359  2         DATACNT,                                ! Number of Data RST Entries in chain
;  4255          4360  2         INVOC_LOC,                              ! Location in NAMELIST where invocation
;  4256          4361  2                                                 !      number belongs (inner-most rout-
;  4257          4362  2                                                 !      ine in SYMID's environment)
;  4258          4363  2         INVOCNUM,                               ! The invocation number itself
;  4259          4364  2         INVPTR: REF RST$ENTRY,                  ! Pointer to Invocation Number RST Entry
;  4260          4365  2         J,                                      ! Pathname vector index
;  4261          4366  2         LINE_END,                               ! Line end address (not actually used)
;  4262          4367  2         LINE_LWRDS,                             ! Number of longwords needed for line
;  4263          4368  2                                                 !      number counted ASCII string
;  4264          4369  2         LINE_NUM,                               ! The line number used to identify an
;  4265          4370  2                                                 !      anonymous lexical entity
;  4266          4371  2         LINE_NUM_FOUND,                         ! Set to TRUE if a line number RST entry
;  4267          4372  2                                                 !      is in the symbol's up-scope chain
;  4268          4373  2         LINE_NUM_LOC,                           ! Location in NAMELIST before which the
;  4269          4374  2                                                 !      line number should be inserted
```

```
;  4270          4375  2          LINE_NUM_PTR: REF VECTOR[,BYTE],! Pointer to line number counted ASCII
;  4271          4376  2          LINE_START,                     ! Line start address (not actually used)
;  4272          4377  2          LINE_STRING: VECTOR[40,BYTE],   ! Vector used to build ASCII line number
;  4273          4378  2          LSI,                            ! Index of next location in LINE_STRING
;  4274          4379  2          MODPTR,                         ! Module RST pointer (not actually used)
;  4275          4380  2          NAMECNT,                        ! The number of pathname components
;  4276          4381  2          NAMELIST: VECTOR[DBG$K_MAX_PATHNAME],   ! Vector of pointers to names
;  4277          4382  2          NAMEPTR: REF VECTOR[,BYTE],     ! Pointer to current pathname component
;  4278          4383  2                                          !    (as a Counted ASCII string)
;  4279          4384  2          NO_NULL_NAME,                   ! Set to TRUE if no null lexical entity
;  4280          4385  2                                          !    name is in up-scope chain
;  4281          4386  2          NO_ROUTINE,                     ! Set to TRUE if inner-most routine has
;  4282          4387  2                                          !    not yet been found up-scope
;  4283          4388  2          PATHDESCR: REF PTH$PATHNAME,    ! Pointer to Pathname Descriptor
;  4284          4389  2          PATHVEC: REF VECTOR[,LONG],     ! Pointer to pathname vector in descr.
;  4285          4390  2          RSTPTR: REF RST$ENTRY,          ! Pointer to current RST entry
;  4286          4391  2          STATUS,                         ! Status code returned by called routine
;  4287          4392  2          STMT_NUM;                       ! Statement number within line number
;  4288          4393  2
;  4289          4394  2
;  4290          4395  2
;  4291          4396  2      ! Initialize some pointers and counters for the up-scope chain loop.
;  4292          4397  2      !
;  4293          4398  2      RSTPTR = .SYMID;
;  4294          4399  2      NAMECNT = 0;
;  4295          4400  2      DATACNT = 0;
;  4296          4401  2      LINE_NUM_FOUND = FALSE;
;  4297          4402  2      LINE_NUM_LOC = 1000000;
;  4298          4403  2      NO_NULL_NAME = TRUE;
;  4299          4404  2      NO_ROUTINE = TRUE;
;  4300          4405  2
;  4301          4406  2
;  4302          4407  2      ! Go up the input symbol's up-scope chain to determine how many pathname
;  4303          4408  2      ! components the symbol has.  We also determine how much data qualification
;  4304          4409  2      ! there is and whether a line number needs to be supplied in the pathname.
;  4305          4410  2      !
;  4306          4411  2      WHILE TRUE DO
;  4307          4412  3          BEGIN
;  4308          4413  3
;  4309          4414  3
;  4310          4415  3          ! Get the name of the pathname component.  Unless the name is null,
;  4311          4416  3          ! save a pointer to the name string in the NAMELIST vector.
;  4312          4417  3          !
;  4313          4418  3          NAMEPTR = DBG$GET_DST_NAME(.RSTPTR[RST$L_DSTPTR]);
;  4314          4419  3          IF .NAMEPTR[0] NEQ 0
;  4315          4420  3          THEN
;  4316          4421  4              BEGIN
;  4317          4422  4              IF .NAMECNT GEQ DBG$K_MAX_PATHNAME THEN EXITLOOP;
;  4318          4423  4              NAMELIST[.NAMECNT] = .NAMEPTR;
;  4319          4424  4              NAMECNT = .NAMECNT + 1;
;  4320          4425  3              END;
;  4321          4426  3
;  4322          4427  3
;  4323          4428  3          ! If this is a global symbol, exit the up-scope loop right away.
;  4324          4429  3          !
;  4325          4430  3          IF .RSTPTR[RST$V_GLOBAL] THEN EXITLOOP;
;  4326          4431  3
```

```
;  4327     4432  3
;  4328     4433  3          ! Determine what kind of RST entry this is and act accordingly.
;  4329     4434  3          !
;  4330     4435  3          CASE .RSTPTR[RST$B_KIND] FROM RST$K_KIND_MINIMUM TO RST$K_KIND_MAXIMUM OF
;  4331     4436  3              SET
;  4332     4437  3
;  4333     4438  3              [RST$K_MODULE]:
;  4334     4439  3                  EXITLOOP;
;  4335     4440  3
;  4336     4441  3              [RST$K_ROUTINE,
;  4337     4442  3               RST$K_BLOCK]:
;  4338     4443  4                  BEGIN
;  4339     4444  4                  IF .NO_ROUTINE AND (.NAMEPTR[0] NEQ 0) AND
;  4340     4445  5                     (.RSTPTR[RST$B_KIND] EQL RST$K_ROUTINE)
;  4341     4446  4                  THEN
;  4342     4447  5                      BEGIN
;  4343     4448  5                      NO_ROUTINE = FALSE;
;  4344     4449  5                      INVOC_LOC = .NAMECNT - 1;
;  4345     4450  4                      END;
;  4346     4451  4
;  4347     4452  4                  IF (.NAMEPTR[0] EQL 0) AND .NO_NULL_NAME
;  4348     4453  4                  THEN
;  4349     4454  5                      BEGIN
;  4350     4455  5                      LINE_NUM_LOC = .NAMECNT;
;  4351     4456  5                      MODPTR = .RSTPTR;
;  4352     4457  5                      IF DBG$PC_TO_LINE_LOOKUP(.RSTPTR[RST$L_STARTADDR],
;  4353     4458  5                                               LINE_NUM, STMT_NUM,
;  4354     4459  5                                               LINE_START, LINE_END, MODPTR)
;  4355     4460  5                      THEN NO_NULL_NAME = FALSE;
;  4356     4461  4                      END;
;  4357     4462  4
;  4358     4463  3                  END;
;  4359     4464  3
;  4360     4465  3              [RST$K_ENTRY,
;  4361     4466  3               RST$K_OVERLOAD,
;  4362     4467  3               RST$K_LABEL]:
;  4363     4468  3                  0;
;  4364     4469  3
;  4365     4470  3              [RST$K_LINE]:
;  4366     4471  3                  LINE_NUM_FOUND = TRUE;
;  4367     4472  3
;  4368     4473  3              [RST$K_DATA,
;  4369     4474  3               RST$K_TYPE,
;  4370     4475  3               RST$K_TYPCOMP]:
;  4371     4476  3                  IF .NAMEPTR[0] NEQ 0 THEN DATACNT = .DATACNT + 1;
;  4372     4477  3
;  4373     4478  3              [INRANGE]:
;  4374     4479  3                  $DBG_ERROR('RSTACCESS\SYMPATHNAME');
;  4375     4480  3
;  4376     4481  3              TES;
;  4377     4482  3
;  4378     4483  3
;  4379     4484  3          ! Link to the next RST entry up-scope from this one.  Then loop.
;  4380     4485  3          !
;  4381     4486  3          RSTPTR = .RSTPTR[RST$L_UPSCOPEPTR];
;  4382     4487  2          END;
;  4383     4488  2
```

```
;  4384          4489  2
;  4385          4490  2          ! Determine how many levels of data qualification (e.g., 2 for M\A.B.C)
;  4386          4491  2          ! there is in the pathname.
;  4387          4492  2          !
;  4388          4493  2          IF .DATACNT EQL 0
;  4389          4494  2          THEN
;  4390          4495  2              COMPCNT = 0
;  4391          4496  2          ELSE
;  4392          4497  2              COMPCNT = .DATACNT - 1;
;  4393          4498  2
;  4394          4499  2
;  4395          4500  2          ! If there already is a line number in the pathname, do not insert an extra
;  4396          4501  2          ! line number due to a null lexical entity name.
;  4397          4502  2          !
;  4398          4503  2          IF .NO_NULL_NAME OR .LINE_NUM_FOUND THEN LINE_NUM_LOC = 1000000;
;  4399          4504  2
;  4400          4505  2
;  4401          4506  2          ! If we do have to supply a line number in the pathname to identify an
;  4402          4507  2          ! anonymous lexical entity, generate the line number counted ASCII string.
;  4403          4508  2          !
;  4404          4509  2          LINE_LWRDS = 0;
;  4405          4510  2          IF .LINE_NUM_LOC NEQ 1000000
;  4406          4511  2          THEN
;  4407          4512  3              BEGIN
;  4408          4513  3              LSI = 0;
;  4409          4514  3
;  4410          4515  3
;  4411          4516  3              ! If there is a statement number, convert that to ASCII decimal.
;  4412          4517  3              !
;  4413          4518  3              IF .STMT_NUM NEQ 0
;  4414          4519  3              THEN
;  4415          4520  4                  BEGIN
;  4416          4521  4                  WHILE .STMT_NUM NEQ 0 DO
;  4417          4522  5                      BEGIN
;  4418          4523  5                      LINE_STRING[.LSI] = (.STMT_NUM MOD 10) + '0';
;  4419          4524  5                      LSI = .LSI + 1;
;  4420          4525  5                      STMT_NUM = .STMT_NUM/10;
;  4421          4526  4                      END;
;  4422          4527  4
;  4423          4528  4                  LINE_STRING[.LSI] = '.';
;  4424          4529  4                  LSI = .LSI + 1;
;  4425          4530  3                  END;
;  4426          4531  3
;  4427          4532  3
;  4428          4533  3              ! Convert the main statement number to ASCII decimal.
;  4429          4534  3              !
;  4430          4535  3              WHILE .LINE_NUM NEQ 0 DO
;  4431          4536  4                  BEGIN
;  4432          4537  4                  LINE_STRING[.LSI] = (.LINE_NUM MOD 10) + '0';
;  4433          4538  4                  LSI = .LSI + 1;
;  4434          4539  4                  LINE_NUM = .LINE_NUM/10;
;  4435          4540  3                  END;
;  4436          4541  3
;  4437          4542  3
;  4438          4543  3              ! Compute the number of longwords we will need for the line number.
;  4439          4544  3              !
;  4440          4545  3              LINE_LWRDS = (.LSI + 13)/4;
```

```
;  4441          4546  2          END;
;  4442          4547  2
;  4443          4548  2
;  4444          4549  2      ! Determine what the invocation number is.  If it turns out to be zero,
;  4445          4550  2      ! we do not explicitly put it in the Pathname Descriptor.
;  4446          4551  2      !
;  4447          4552  2      INVOCNUM = 0;
;  4448          4553  2      IF .SYMID[RST$V_INVOCNUM]
;  4449          4554  2      THEN
;  4450          4555  3          BEGIN
;  4451          4556  3          INVPTR = .SYMID[RST$L_SYMCHNPTR];
;  4452          4557  3          INVOCNUM = .INVPTR[RST$L_INVOCNUM];
;  4453          4558  3          END;
;  4454          4559  2
;  4455          4560  2      IF .INVOCNUM EQL 0 THEN INVOC_LOC = 1000000;
;  4456          4561  2
;  4457          4562  2
;  4458          4563  2      ! Allocate space for a Pathname Descriptor for the symbol.
;  4459          4564  2      !
;  4460          4565  2      PATHDESCR = DBG$GET_TEMPMEM(DBG$K_PATHDESCSIZE + .NAMECNT + .LINE_LWRDS);
;  4461          4566  2      PATHVEC = PATHDESCR[PTH$A_PATHVECTOR];
;  4462          4567  2
;  4463          4568  2
;  4464          4569  2      ! Fill in the Pathname Descriptor's header.
;  4465          4570  2      !
;  4466          4571  2      PATHDESCR[PTH$B_TOTCNT] = .NAMECNT;
;  4467          4572  2      PATHDESCR[PTH$B_PATHCNT] = .NAMECNT - .COMPCNT;
;  4468          4573  2      PATHDESCR[PTH$B_LOCINVOC] = 0;
;  4469          4574  2      PATHDESCR[PTH$L_INVOCNUM] = 0;
;  4470          4575  2
;  4471          4576  2
;  4472          4577  2      ! Fill in the pointers to the pathname component names.
;  4473          4578  2      !
;  4474          4579  2      J = 0;
;  4475          4580  2      DECR I FROM .NAMECNT - 1 TO 0 DO
;  4476          4581  3          BEGIN
;  4477          4582  3          PATHVEC[.J] = .NAMELIST[.I];
;  4478          4583  3          J = .J + 1;
;  4479          4584  3
;  4480          4585  3
;  4481          4586  3          ! If this is where the invocation number goes, mark that in the header.
;  4482          4587  3          !
;  4483          4588  3          IF .I EQL .INVOC_LOC
;  4484          4589  3          THEN
;  4485          4590  4              BEGIN
;  4486          4591  4              PATHDESCR[PTH$B_LOCINVOC] = .J;
;  4487          4592  4              PATHDESCR[PTH$L_INVOCNUM] = .INVOCNUM;
;  4488          4593  3              END;
;  4489          4594  3
;  4490          4595  3
;  4491          4596  3          ! If this is where the extra line number goes, fill that in.
;  4492          4597  3          !
;  4493          4598  3          IF .J EQL .LINE_NUM_LOC
;  4494          4599  3          THEN
;  4495          4600  4              BEGIN
;  4496          4601  4              LINE_NUM_PTR = PATHVEC[.NAMECNT + 1];
;  4497          4602  4              LINE_NUM_PTR[0] = .LSI + 6;
```

```
;  4498          4603  4              LINE_NUM_PTR[1] = '%';
;  4499          4604  4              LINE_NUM_PTR[2] = 'L';
;  4500          4605  4              LINE_NUM_PTR[3] = 'I';
;  4501          4606  4              LINE_NUM_PTR[4] = 'N';
;  4502          4607  4              LINE_NUM_PTR[5] = 'E';
;  4503          4608  4              LINE_NUM_PTR[6] = ' ';
;  4504          4609  4              INCR K FROM 1 TO .LSI DO
;  4505          4610  4                  LINE_NUM_PTR[.K + 6] = .LINE_STRING[.LSI - .K];
;  4506          4611  4
;  4507          4612  4              PATHVEC[.J] = .LINE_NUM_PTR;
;  4508          4613  4              J = .J + 1;
;  4509          4614  3              END;
;  4510          4615  3
;  4511          4616  2          END;
;  4512          4617  2
;  4513          4618  2
;  4514          4619  2      ! Finally return the address of the Pathname Descriptor to PATHNAME.  Then
;  4515          4620  2      ! return.
;  4516          4621  2      !
;  4517          4622  2      PATHNAME[0] = .PATHDESCR;
;  4518          4623  2      RETURN;
;  4519          4624  2
;  4520          4625  1      END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

50  4D  59  53  5C  53  53  45  43  43  41  54  53  52  15  00211 P.ABD:  .ASCII  <21>\RSTACCESS\<92>\SYMPATHNAME\                ;
                             45  4D  41  4E  48  54  41  00220                                                                ;


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                 0FFC 00000             .ENTRY  DBG$STA_SYMPATHNAME, Save R2,R3,R4,R5,R6,-      ; 4318
                                                                                R7,R8,R9,R10,R11                                ;
                                              5E      FEFC   CE  9E 00002       MOVAB   -260(SP), SP                            ;
                                              55        04   AC  D0 00007       MOVL    SYMID, R5                               ; 4398
                                              52             55  D0 0000B       MOVL    R5, RSTPTR                              ;
                                                             53  D4 0000E       CLRL    NAMECNT                                 ; 4399
                                                             5A  D4 00010       CLRL    LINE_NUM_FOUND                          ; 4401
                                              5B 000F4240    8F  D0 00012       MOVL    #1000000, LINE_NUM_LOC                  ; 4402
                                              56             01  7D 00019       MOVQ    #1, NO_NULL_NAME                        ; 4403
                                              58             01  D0 0001C       MOVL    #1, NO_ROUTINE                          ; 4404
                                                       0C    A2  DD 0001F 1$:    PUSHL   12(RSTPTR)                              ; 4418
                                 00000000G    00             01  FB 00022       CALLS   #1, DBG$GET_DST_NAME                    ;
                                              59             50  D0 00029       MOVL    R0, NAMEPTR                             ;
                                                             50  D4 0002C       CLRL    R0                                      ; 4419
                                                             69  95 0002E       TSTB    (NAMEPTR)                               ;
                                                             0E  13 00030       BEQL    2$                                      ;
                                                             50  D6 00032       INCL    R0                                      ;
                                                   32            53  D1 00034       CMPL    NAMECNT, #50                            ; 4422
                                                             2C  18 00037       BGEQ    4$                                      ;
                                                 14 AE43         59  D0 00039       MOVL    NAMEPTR, NAMELIST[NAMECNT]              ; 4423
                                                             53  D6 0003E       INCL    NAMECNT                                 ; 4424
                                                   21        15  A2  E8 00040 2$:    BLBS    21(RSTPTR), 4$                          ; 4430
```

```
                OD      00    14   A2  8F 00044          CASEB   20(RSTPTR), #0, #13                      ; 4435
        001E    001E    0084       0068    00049 3$:      .WORD   9$-3$,-                                 ;
        0061    0061    005C       007D    00051          11$-3$,-                                        ;
        0068    0061    0068       007D    00059          5$-3$,-                                         ;
                        007D       0068    00061          5$-3$,-                                         ;
                                                          10$-3$,-                                        ;
                                                          7$-3$,-                                         ;
                                                          8$-3$,-                                         ;
                                                          8$-3$,-                                         ;
                                                          10$-3$,-                                        ;
                                                          9$-3$,-                                         ;
                                                          8$-3$,-                                         ;
                                                          9$-3$,-                                         ;
                                                          9$-3$,-                                         ;
                                                          10$-3$                                          ;
                              66   11 00065 4$:     BRB     11$                                         ; 4439
                          0F  58   E9 00067 5$:     BLBC    NO_ROUTINE, 6$                              ; 4444
                          0C  50   E9 0006A         BLBC    R0, 6$                                      ;
                          02  14   A2 91 0006D     CMPB    20(RSTPTR), #2                              ; 4445
                              06   12 00071         BNEQ    6$                                          ;
                              58   D4 00073         CLRL    NO_ROUTINE                                  ; 4448
                          54  FF   A3 9E 00075     MOVAB   -1(R3), INVOC_LOC                           ; 4449
                              69   95 00079 6$:     TSTB    (NAMEPTR)                                   ; 4452
                              49   12 0007B         BNEQ    10$                                         ;
                          46       56   E9 0007D     BLBC    NO_NULL_NAME, 10$                           ;
                          5B       53   D0 00080     MOVL    NAMECNT, LINE_NUM_LOC                       ; 4455
                          6E       52   D0 00083     MOVL    RSTPTR, MODPTR                              ; 4456
                                   5E   DD 00086     PUSHL   SP                                          ; 4457
                              08   AE   9F 00088     PUSHAB  LINE_END                                    ;
                              10   AE   9F 0008B     PUSHAB  LINE_START                                  ;
                              18   AE   9F 0008E     PUSHAB  STMT_NUM                                    ;
                              20   AE   9F 00091     PUSHAB  LINE_NUM                                    ;
                              18   A2   DD 00094     PUSHL   24(RSTPTR)                                  ;
00000000G     00                   06   FB 00097     CALLS   #6, DBG$PC_TO_LINE_LOOKUP                   ;
              25                   50   E9 0009E     BLBC    R0, 10$                                     ;
                                   56   D4 000A1     CLRL    NO_NULL_NAME                                ; 4460
                                   21   11 000A3     BRB     10$                                         ; 4435
                          5A       01   D0 000A5 7$:     MOVL    #1, LINE_NUM_FOUND                      ; 4471
                                   1C   11 000A8     BRB     10$                                         ;
                          19       50   E9 000AA 8$:     BLBC    R0, 10$                                 ; 4476
                                   57   D6 000AD     INCL    DATACNT                                     ;
                                   15   11 000AF     BRB     10$                                         ;
                      00000000'    EF   9F 000B1 9$:     PUSHAB  P.ABD                                   ; 4479
                                   01   DD 000B7     PUSHL   #1                                          ;
                      00028362     8F   DD 000B9     PUSHL   #164706                                     ;
00000000G     00                   03   FB 000BF     CALLS   #3, LIB$SIGNAL                              ;
              52          10       A2   D0 000C6 10$:     MOVL    16(RSTPTR), RSTPTR                      ; 4486
                        FF52       31   11 000CA     BRW     1$                                          ; 4411
                                   57   D5 000CD 11$:     TSTL    DATACNT                                 ; 4493
                                   04   12 000CF     BNEQ    12$                                         ;
                                   58   D4 000D1     CLRL    COMPCNT                                     ; 4495
                                   04   11 000D3     BRB     13$                                         ;
                          58       FF   A7 9E 000D5 12$:     MOVAB   -1(R7), COMPCNT                     ; 4497
                          03           56   E8 000D9 13$:     BLBS    NO_NULL_NAME, 14$                   ; 4503
                          07           5A   E9 000DC     BLBC    LINE_NUM_FOUND, 15$                     ;
                          5B  000F4240 8F   D0 000DF 14$:     MOVL    #1000000, LINE_NUM_LOC              ;
                                       51   D4 000E6 15$:     CLRL    LINE_LWRDS                          ; 4509
```

```
                    000F4240   8F            5B  D1 000E8          CMPL    LINE_NUM_LOC, #1000000                          ; 4510
                                              4F  13 000EF          BEQL    20$                                             ;
                                              52  D4 000F1          CLRL    LSI                                             ; 4513
                                        0C    AE  D5 000F3          TSTL    STMT_NUM                                        ; 4518
                                              22  13 000F6          BEQL    18$                                             ;
                                              19  13 000F8 16$:     BEQL    17$                                             ; 4521
                7E          00        0C    AE      01  7A 000FA    EMUL    #1, STMT_NUM, #0, -(SP)                         ; 4523
                50          50              8E      0A  7B 00100    EDIV    #10, (SP)+, R0, R0                              ;
             D8 AD42                        50      30  81 00105    ADDB3   #48, R0, LINE_STRING[LSI]                       ;
                                              52  D6 0010B          INCL    LSI                                             ; 4524
                                        0C    AE      0A  C6 0010D    DIVL2   #10, STMT_NUM                                   ; 4525
                                              E5  11 00111          BRB     16$                                             ; 4521
                                        D8 AD42       2E  90 00113 17$:     MOVB    #46, LINE_STRING[LSI]                   ; 4528
                                              52  D6 00118          INCL    LSI                                             ; 4529
                                        10    AE  D5 0011A 18$:     TSTL    LINE_NUM                                        ; 4535
                                              19  13 0011D          BEQL    19$                                             ;
                7E          00        10    AE      01  7A 0011F    EMUL    #1, LINE_NUM, #0, -(SP)                         ; 4537
                50          50              8E      0A  7B 00125    EDIV    #10, (SP)+, R0, R0                              ;
             D8 AD42                        50      30  81 0012A    ADDB3   #48, R0, LINE_STRING[LSI]                       ;
                                              52  D6 00130          INCL    LSI                                             ; 4538
                                        10    AE      0A  C6 00132    DIVL2   #10, LINE_NUM                                   ; 4539
                                              E2  11 00136          BRB     18$                                             ; 4535
                                        56    0D      A2  9E 00138 19$:     MOVAB   13(R2), R6                              ; 4545
                            51          56      04  C7 0013C    DIVL3   #4, R6, LINE_LWRDS                              ;
                                              5A  D4 00140 20$:     CLRL    INVOCNUM                                        ; 4552
                            08    15    A5      02  E1 00142    BBC     #2, 21(R5), 21$                                 ; 4553
                                        50    08    A5  D0 00147    MOVL    8(R5), INVPTR                                   ; 4556
                                        5A    18    A0  D0 0014B    MOVL    24(INVPTR), INVOCNUM                            ; 4557
                                              07  12 0014F 21$:     BNEQ    22$                                             ; 4560
                                        54 000F4240   8F  D0 00151    MOVL    #1000000, INVOC_LOC                             ;
                                           02 A143    9F  00158 22$:     PUSHAB  2(LINE_LWRDS)[NAMECNT]                      ; 4565
                    00000000G   00                    01  FB 0015C    CALLS   #1, DBG$GET_TEMPMEM                             ;
                                        59    08      A0  9E 00163    MOVAB   8(R0), PATHVEC                                  ; 4566
                                        60            53  90 00167    MOVB    NAMECNT, (PATHDESCR)                            ; 4571
                01    A0                53            58  83 0016A    SUBB3   COMPCNT, NAMECNT, 1(PATHDESCR)                  ; 4572
                                           02    A0   94  0016F    CLRB    2(PATHDESCR)                                    ; 4573
                                           04    A0   D4  00172    CLRL    4(PATHDESCR)                                    ; 4574
                                                 57   D4  00175    CLRL    J                                               ; 4579
                                        51            53  D0 00177    MOVL    NAMECNT, I                                      ; 4588
                                                      4A  11 0017A    BRB     27$                                             ;
                                     6947          14 AE41  D0 0017C 23$:     MOVL    NAMELIST[I], (PATHVEC)[J]           ; 4582
                                                 57   D6  00182    INCL    J                                               ; 4583
                                        54            51  D1 00184    CMPL    I, INVOC_LOC                                    ; 4588
                                                      08  12 00187    BNEQ    24$                                             ;
                                  02    A0                57  90 00189    MOVB    J, 2(PATHDESCR)                             ; 4591
                                  04    A0                5A  D0 0018D    MOVL    INVOCNUM, 4(PATHDESCR)                      ; 4592
                                        5B                57  D1 00191 24$:     CMPL    J, LINE_NUM_LOC                     ; 4598
                                                          30  12 00194          BNEQ    27$                                 ;
                                        55          04 A943   DE  00196          MOVAL   4(PATHVEC)[NAMECNT], LINE_NUM_PTR   ; 4601
                            65          52                06  81 0019B    ADDB3   #6, LSI, (LINE_NUM_PTR)                    ; 4602
                                  01    A5 4E494C25     8F  D0 0019F    MOVL    #1313426469, 1(LINE_NUM_PTR)                ; 4603
                                  05    A5      2045    8F  B0 001A7    MOVW    #8261, 5(LINE_NUM_PTR)                      ; 4607
                                                 58   D4  001AD    CLRL    K                                               ; 4609
                                                      0B  11 001AF    BRB     26$                                             ;
                            56          52                58  C3 001B1 25$:     SUBL3   K, LSI, R6                          ; 4610
                                  06 A845           D8 AD46  90 001B5          MOVB    LINE_STRING[R6], 6(K)[LINE_NUM_PTR]     ;
                            F1          58                52  F3 001BC 26$:     AOBLEQ  LSI, K, 25$                         ;
```

```
                    6947        55  D0 001C0        MOVL    LINE_NUM_PTR, (PATHVEC)[J]          ; 4612
                                57  D6 001C4        INCL    J                                   ; 4613
                       B3       51  F4 001C6 27$:   SOBGEQ  I, 23$                             ; 4580
                 08    BC       50  D0 001C9        MOVL    PATHDESCR, @PATHNAME                ; 4622
                                    04 001CD        RET                                         ; 4625

; Routine Size:  462 bytes,    Routine Base:  DBG$CODE + 1C8F
```

```
;  4522          4626  1 GLOBAL ROUTINE DBG$STA_SYMVALUE(SYMID, VALPTR, VALKIND): NOVALUE =
;  4523          4627  1 !
;  4524          4628  1 ! FUNCTION
;  4525          4629  1 !       This routine accepts a symbol identifier and returns a pointer to the
;  4526          4630  1 !       corresponding symbol's value.  The symbol identifier is the unique
;  4527          4631  1 !       identifier produced by routine DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.
;  4528          4632  1 !
;  4529          4633  1 !       This routine requires a "context" to have been established by a call on
;  4530          4634  1 !       routine DBG$STA_SETCONTEXT if there are any register references in the
;  4531          4635  1 !       DST Value Spec which defines the symbol's value.  If such a reference
;  4532          4636  1 !       occurs and no context exists, an error is signalled.
;  4533          4637  1 !
;  4534          4638  1 !       The interpretation of the value stored at the returned address is up to
;  4535          4639  1 !       the language-specific routines in light of the symbol's data type.  The
;  4536          4640  1 !       data type specification must therefore include all length information.
;  4537          4641  1 !
;  4538          4642  1 ! INPUTS
;  4539          4643  1 !       SYMID   - A longword symbol identifier previously produced by routine
;  4540          4644  1 !                 DBG$STA_GETSYMBOL or DBG$STA_GETSYMOFF.  SYMID uniquely ident-
;  4541          4645  1 !                 ifies the symbol whose "value" is to be returned.
;  4542          4646  1 !
;  4543          4647  1 !       VALPTR  - The address of a three-longword vector to receive the value
;  4544          4648  1 !                 pointer and the corresponding stack frame pointer.
;  4545          4649  1 !
;  4546          4650  1 !       VALKIND - The address of a longword location to receive the value kind.
;  4547          4651  1 !
;  4548          4652  1 ! OUTPUTS
;  4549          4653  1 !       VALPTR  - A pointer to the desired value is returned to VALPTR.  The
;  4550          4654  1 !                 byte address of the value is returned to VALPTR[0] and the
;  4551          4655  1 !                 bit offset from that address is returned to VALPTR[1].  The
;  4552          4656  1 !                 corresponding stack Frame Pointer is returned to VALPTR[2].
;  4553          4657  1 !                 VALPTR[2] will contain zero if no frame pointer is applicable.
;  4554          4658  1 !
;  4555          4659  1 !       VALKIND - The kind of the value pointed to by VALPTR is returned to
;  4556          4660  1 !                 VALKIND.  These are the possible values:
;  4557          4661  1 !
;  4558          4662  1 !                       DBG$K_VAL_NOVALUE - The symbol has no value.
;  4559          4663  1 !                       DBG$K_VAL_LITERAL - VALPTR points to a literal value.
;  4560          4664  1 !                       DBG$K_VAL_ADDR    - VALPTR contains an address.
;  4561          4665  1 !                       DBG$K_VAL_DESCR   - VALPTR contains the address of a
;  4562          4666  1 !                                           descriptor.
;  4563          4667  1 !
;  4564          4668  1 !       No value is returned by DBG$STA_SYMVALUE.
;  4565          4669  1 !
;  4566          4670  1
;  4567          4671  2     BEGIN
;  4568          4672  2
;  4569          4673  2     MAP
;  4570          4674  2         SYMID: REF RST$ENTRY,                ! Pointer to input symbol's RST entry
;  4571          4675  2         VALPTR: REF VECTOR[3],               ! Pointer to caller's value vector
;  4572          4676  2         VALKIND: REF VECTOR[1];              ! Pointer to value kind parameter
;  4573          4677  2
;  4574          4678  2     LOCAL
;  4575          4679  2         BLITRLR: REF DST$BLI_TRAILER1,       ! Pointer to Bliss DST record trailer
;  4576          4680  2         BLIVALSPEC: BLOCK[8,BYTE]            ! Value Spec buffer for Bliss special
;  4577          4681  2                 FIELD(DST$VS_HDR_FIELDS),    !    cases DST record
;  4578          4682  2         CH_TRLR_PTR: REF DST$CH_TRLR,        ! Pointer to COBOL Hack DST trailer
```

```
;  4579          4683  2          DSTPTR: REF DST$RECORD,          ! Pointer to symbol's DST record
;  4580          4684  2          VALLOC: REF VECTOR[,LONG];       ! Value location from Stack Machine
;  4581          4685  2
;  4582          4686  2
;  4583          4687  2      ! Initially zero out the returned value pointer and frame pointer.
;  4584          4688  2      !
;  4585          4689  2      VALPTR[0] = 0;
;  4586          4690  2      VALPTR[1] = 0;
;  4587          4691  2      VALPTR[2] = 0;
;  4588          4692  2
;  4589          4693  2      ! Determine what kind of RST entry SYMID identifies and act accordingly.
;  4590          4694  2      !
;  4591          4695  2      CASE .SYMID[RST$B_KIND] FROM RST$K_KIND_MINIMUM TO RST$K_KIND_MAXIMUM OF
;  4592          4696  2          SET
;  4593          4697  2
;  4594          4698  2          ! For instruction addresses, return the start address in the RST entry.
;  4595          4699  2          !
;  4596          4700  2          [RST$K_ROUTINE, RST$K_BLOCK,
;  4597          4701  2           RST$K_ENTRY, RST$K_LABEL,
;  4598          4702  2           RST$K_LINE]:
;  4599          4703  3              BEGIN
;  4600          4704  3              VALPTR[0] = .SYMID[RST$L_STARTADDR];
;  4601          4705  3              VALKIND[0] = DBG$K_VAL_ADDR;
;  4602          4706  3              RETURN;
;  4603          4707  3              END;
;  4604          4708  2
;  4605          4709  2          ! For Types, return the No-Value code to VALKIND.
;  4606          4710  2          !
;  4607          4711  2          [RST$K_TYPE]:
;  4608          4712  3              BEGIN
;  4609          4713  3              VALKIND[0] = DBG$K_VAL_NOVALUE;
;  4610          4714  3              RETURN;
;  4611          4715  3              END;
;  4612          4716  2
;  4613          4717  2          ! For most other kinds (including Module) signal an internal error.
;  4614          4718  2          !
;  4615          4719  2          [INRANGE, OUTRANGE]:
;  4616          4720  2              $DBG_ERROR('RSTACCESS\SYMVALUE 10');
;  4617          4721  2
;  4618          4722  2          ! For Data and Type Components, do nothing here--we handle them below.
;  4619          4723  2          !
;  4620          4724  2          [RST$K_DATA, RST$K_TYPCOMP]:
;  4621          4725  2              0;
;  4622          4726  2
;  4623          4727  2          TES;
;  4624          4728  2
;  4625          4729  2      ! Obtain the DST record describing this object. If there are
;  4626          4730  2      ! continuation records then merge them into a single new DST record.
;  4627          4731  2      !
;  4628          4732  2      DSTPTR = .SYMID[RST$L_DSTPTR];
;  4629          4733  2
;  4630          4734  2
;  4631          4735  2
;  4632          4736  2
;  4633          4737  2
;  4634          4738  2
;  4635          4739  2
```

```
;  4636          4740  2
;  4637          4741  2
;  4638          4742  2      ! For the items not yet handled (i.e., for data), we determine the type of
;  4639          4743  2      ! DST record which holds the value specification and act accordingly.
;  4640          4744  2      !
;  4641          4745  2      CASE .DSTPTR[DST$B_TYPE] FROM 0 TO 255 OF
;  4642          4746  2          SET
;  4643          4747  2
;  4644          4748  2
;  4645          4749  2          ! Handle all normal DST records, i.e. those of the standard format.
;  4646          4750  2          ! Find the Value Spec and pass it to DBG$STA_VALSPEC for evaluation.
;  4647          4751  2          !
;  4648          4752  2          [DSC$K_DTYPE_LOWEST TO DSC$K_DTYPE_HIGHEST,
;  4649          4753  2           DST$K_BOOL, DST$K_SEPTYP, DST$K_LBLORLIT,
;  4650          4754  2           DST$K_ENTRY, DST$K_RTNBEG, DST$K_BLKBEG,
;  4651          4755  2           DST$K_RECBEG, DST$K_ENUMELT]:
;  4652          4756  3              BEGIN
;  4653          4757  3
;  4654          4758  3              ! All these checks on the call to VALSPEC are here to allow the
;  4655          4759  3              ! user to examine only registers after the completion of the user
;  4656          4760  3              ! program.  e.g.  EX %R0 or EX 0\R1
;  4657          4761  3              !
;  4658          4762  3              LOCAL
;  4659          4763  3                  MODPTR : REF RST$ENTRY;
;  4660          4764  3
;  4661          4765  3              MODPTR = .SYMID[RST$L_UPSCOPEPTR];
;  4662          4766  3              IF (.DBG$GV_CONTROL[DBG$V_CONTROL_DONE]) AND
;  4663          4767  3                 (.SYMID[RST$V_REGISTER]) AND
;  4664          4768  4                 (.MODPTR NEQ 0)
;  4665          4769  3              THEN
;  4666          4770  3                  IF (.MODPTR[RST$V_MODNUMSCP]) AND
;  4667          4771  4                     (.MODPTR[RST$L_MODSCPNUM] EQL 0)
;  4668          4772  3                  THEN
;  4669          4773  3                      DBG$STA_VALSPEC(DSTPTR[DST$B_VFLAGS], .VALPTR, .VALKIND, TRUE)
;  4670          4774  3                  ELSE
;  4671          4775  3                      DBG$STA_VALSPEC(DSTPTR[DST$B_VFLAGS], .VALPTR, .VALKIND, FALSE)
;  4672          4776  3              ELSE
;  4673          4777  3                  DBG$STA_VALSPEC(DSTPTR[DST$B_VFLAGS], .VALPTR, .VALKIND, FALSE);
;  4674          4778  2              END;
;  4675          4779  2
;  4676          4780  2
;  4677          4781  2          ! Handle the Label DST record.  Here we get the label address directly
;  4678          4782  2          ! from the DST$L_VALUE field--the DST$B_VFLAGS field is not provided.
;  4679          4783  2          !
;  4680          4784  2          [DST$K_LABEL]:
;  4681          4785  3              BEGIN
;  4682          4786  3              VALPTR[0] = .DSTPTR[DST$L_VALUE];
;  4683          4787  3              VALKIND[0] = DBG$K_VAL_ADDR;
;  4684          4788  2              END;
;  4685          4789  2
;  4686          4790  2
;  4687          4791  2          ! Handle the Bliss Special Cases DST record.  Construct a Value Spec
;  4688          4792  2          ! from the VFLAGS and VALUE fields in the record (which are not adjacent
;  4689          4793  2          ! in this particular record) and call DSG$STA_VALSPEC with it.
;  4690          4794  2          !
;  4691          4795  2          [DST$K_BLI]:
;  4692          4796  3              BEGIN
```

```
;  4693          4797  ;
;  4694          4798  ;
;  4695          4799  ;
;  4696          4800  ;
;  4697          4801  ;
;  4698          4802  ;
;  4699          4803  ;
;  4700          4804  ;
;  4701          4805  ;
;  4702          4806  ;
;  4703          4807  ;
;  4704          4808  ;
;  4705          4809  ;
;  4706          4810  ;
;  4707          4811  ;
;  4708          4812  ;
;  4709          4813  ;
;  4710          4814  ;
;  4711          4815  ;
;  4712          4816  ;
;  4713          4817  ;
;  4714          4818  ;
;  4715          4819  ;
;  4716          4820  ;
;  4717          4821  ;
;  4718          4822  ;
;  4719          4823  ;
;  4720          4824  ;
;  4721          4825  ;
;  4722          4826  ;
;  4723          4827  ;
;  4724          4828  ;
;  4725          4829  ;
;  4726          4830  ;
;  4727          4831  ;
;  4728          4832  ;
;  4729          4833  ;
;  4730          4834  ;
;  4731          4835  ;
;  4732          4836  ;
;  4733          4837  ;
;  4734          4838  ;
;  4735          4839  ;
;  4736          4840  ;
;  4737          4841  ;
;  4738          4842  ;
;  4739          4843  ;
;  4740          4844  ;
;  4741          4845  ;
;  4742          4846  ;
;  4743          4847  ;
;  4744          4848  ;
;  4745          4849  ;
;  4746          4850  ;
;  4747          4851  ;
;  4748          4852  ;
;  4749          4853  ;

        LOCAL
            MODPTR : REF RST$ENTRY,
            VSPTR: REF DST$VAL_SPEC;


        BLIVALSPEC[DST$B_VS_VFLAGS] = .DSTPTR[DST$B_BLI_VFLAGS];
        BLITRLR = DSTPTR[DST$A_BLI_TRLR1] + .DSTPTR[DST$B_BLI_LNG];
        BLIVALSPEC[DST$L_VS_VALUE] = .BLITRLR[DST$L_BLI_VALUE];


        ! The following is a hack to support BLISS BINDs. The
        ! reason for this hack is that BIND statements in BLISS
        ! can give rise to BLISS data whose DST type code is DST$K_BLI
        ! (this means they are either blocks, blockvectors, vectors,
        ! or bitvectors), and whose valkind is "literal". However,
        ! we want to treat these data items as if their valkind
        ! is "address". See the test TST$:BLIBIND.* for an example.
        ! The reasons why valkind of "literal" doesn't work for these kinds
        ! of BLISS data are too complicated to explain here; they have to
        ! do with our handling of literals in general.
        ! So, we change valkind "literal" to valkind "address" right
        ! here, on the assumption that this only affects BLISS BINDs.
        !
        VSPTR = BLIVALSPEC[DST$B_VS_VFLAGS];
        IF .VSPTR[DST$V_VS_VALKIND] EQL DST$K_VALKIND_LITERAL
        THEN
            VSPTR[DST$V_VS_VALKIND] = DST$K_VALKIND_ADDR;


            ! All these checks on the call to VALSPEC are here to allow the
            ! user to examine only registers after the completion of the user
            ! program.  e.g.  EX %RO or EX 0\R1
            !
            MODPTR = .SYMID[RST$L_UPSCOPEPTR];
            IF (.DBG$GV_CONTROL[DBG$V_CONTROL_DONE]) AND
               (.SYMID[RST$V_REGISTER]) AND
               (.MODPTR NEQ 0)
            THEN
                IF (.MODPTR[RST$V_MODNUMSCP]) AND
                   (.MODPTR[RST$L_MODSCPNUM] EQL 0)
                THEN
                    DBG$STA_VALSPEC(BLIVALSPEC, .VALPTR, .VALKIND, TRUE)
                ELSE
                    DBG$STA_VALSPEC(BLIVALSPEC, .VALPTR, .VALKIND, FALSE)
            ELSE
                DBG$STA_VALSPEC(BLIVALSPEC, .VALPTR, .VALKIND, FALSE);
            END;


        ! Handle the Bliss Field DST record.  Here we just return the address of
        ! the number-of-components field in the DST record.
        !
        [DST$K_BLIFLD]:
            BEGIN
            VALPTR[0] = DSTPTR[DST$L_BLIFLD_COMPS];
            VALKIND[0] = DBG$K_VAL_LITERAL;
            END;
```

```
;  4750          4854  2
;  4751          4855  2
;  4752          4856  2          ! Handle the COBOL Hack DST Record.  Here we evaluate the Stack Machine
;  4753          4857  2          ! code in the DST record and return its value as the symbol address.
;  4754          4858  2          !
;  4755          4859  2          [DST$K_COB_HACK]:
;  4756          4860  2              BEGIN
;  4757          4861  2              CH_TRLR_PTR = DSTPTR[DST$A_COBHACK_TRLR] + .DSTPTR[DST$B_NAME];
;  4758          4862  2              STACK_MACHINE(CH_TRLR_PTR[DST$A_CH_STKRTN_ADDR], VALLOC, VALPTR[2]);
;  4759          4863  2              VALPTR[0] = .VALLOC[0];
;  4760          4864  2              VALPTR[1] = 0;
;  4761          4865  2              VALKIND[0] = DBG$K_VAL_ADDR;
;  4762          4866  2              END;
;  4763          4867  2
;  4764          4868  2
;  4765          4869  2          ! Handle the PSECT DST record.  Here we pick the PSECT start address
;  4766          4870  2          ! directly from the DST record.
;  4767          4871  2          !
;  4768          4872  2          [DST$K_PSECT]:
;  4769          4873  2              BEGIN
;  4770          4874  2              VALPTR[0] = .DSTPTR[DST$L_PSECT_VALUE];
;  4771          4875  2              VALKIND[0] = DBG$K_VAL_ADDR;
;  4772          4876  2              END;
;  4773          4877  2
;  4774          4878  2
;  4775          4879  2          ! Any other DST record causes an error to be signalled.
;  4776          4880  2          !
;  4777          4881  2          [INRANGE]:
;  4778          4882  2              $DBG_ERROR('RSTACCESS\SYMVALUE 20');
;  4779          4883  2
;  4780          4884  2              TES;
;  4781          4885  2
;  4782          4886  2
;  4783          4887  2          ! We have the value.  Now return.
;  4784          4888  2          !
;  4785          4889  2          RETURN;
;  4786          4890  2
;  4787          4891  1          END;


                                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

56 4D 59 53 5C 53 53 45 43 43 41 54 53 52 15 00227 P.ABE:  .ASCII  <21>\RSTACCESS\<92>\SYMVALUE 10\                  ;
                        30 31 20 45 55 4C 41 00236                                                              ;
56 4D 59 53 5C 53 53 45 43 43 41 54 53 52 15 0023D P.ABF:  .ASCII  <21>\RSTACCESS\<92>\SYMVALUE 20\                  ;
                        30 32 20 45 55 4C 41 0024C                                                              ;


                                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                  007C 00000        .ENTRY  DBG$STA_SYMVALUE, Save R2,R3,R4,R5,R6       ; 4626
                                56 00000000G   00   9E 00002        MOVAB   DBG$GV_CONTROL, R6                          ;
                                55 00000000G   00   9E 00009        MOVAB   LIB$SIGNAL, R5                              ;
                                5E             0C   C2 00010        SUBL2   #12, SP                                     ;
                                53       04    AC   7D 00013        MOVQ    SYMID, R3                                   ; 4697
```

```
                                                64  7C 00017          CLRQ    (R4)                                    ; 4690
                                            08  A4  D4 00019          CLRL    8(R4)                                   ; 4692
                                    0D      14  A3  8F 0001C          CASEB   20(R3), #0, #13                         ; 4697
                002F            002F        001C    00021 1$:       .WORD   2$-1$,-                                 ;
                0036            003A        002F    00029           2$-1$,-                                         ;
                001C            003A        001C    00031           3$-1$,-                                         ;
                                            001C    00039           3$-1$,-                                         ;
                                                                    3$-1$,-                                         ;
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                                                                    5$-1$,-                                         ;
                                                                    4$-1$,-                                         ;
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                                                                    2$-1$,-                                         ;
                                                                    2$-1$,-                                         ;
                                                                    2$-1$                                           ;
                                    00000000'   EF  9F 0003D 2$:    PUSHAB  P.ABE                                   ; 4725
                                                01  DD 00043        PUSHL   #1                                      ;
                                    00028362    8F  DD 00045        PUSHL   #164706                                 ;
                                65              03  FB 0004B        CALLS   #3, LIB$SIGNAL                          ;
                                                0B  11 0004E        BRB     5$                                      ;
                                64      18      A3  D0 00050 3$:    MOVL    24(R3), (R4)                            ; 4707
                                            02B4    31 00054        BRW     18$                                     ; 4708
                                            0C  BC  D4 00057 4$:    CLRL    @VALKIND                                ; 4717
                                                04  0005A        RET                                             ; 4716
                                52      0C  A3  D0 0005B 5$:    MOVL    12(R3), DSTPTR                          ; 4739
                            FF  8F      00  01  A2  8F 0005F        CASEB   1(DSTPTR), #0, #255                     ; 4745
                0200            0200        0200    022C    00065 6$:   .WORD   10$-6$,-                                ;
                0200            0200        0200    0200    0006D       7$-6$,-                                     ;
                0200            0200        0200    0200    00075       7$-6$,-                                     ;
                0200            0200        0200    0200    0007D       7$-6$,-                                     ;
                0200            0200        0200    0200    00085       7$-6$,-                                     ;
                0200            0200        0200    0200    0008D       7$-6$,-                                     ;
                0200            0200        0200    0200    00095       7$-6$,-                                     ;
                0200            0200        0200    0200    0009D       7$-6$,-                                     ;
                0200            0200        0200    0200    000A5       7$-6$,-                                     ;
                02AB            02AB        0200    0200    000AD       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000B5       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000BD       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000C5       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000CD       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000D5       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000DD       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000E5       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000ED       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000F5       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    000FD       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    00105       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    0010D       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    00115       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    0011D       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    00125       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    0012D       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    00135       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    0013D       7$-6$,-                                     ;
                02AB            02AB        02AB    02AB    00145       7$-6$,-                                     ;
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        02AB        02AB        02AB        02AB    0014D                   7$-6$,-
        02AB        02AB        02AB        02AB    00155                   7$-6$,-
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        02AB        02AB        02AB        02AB    0016D                   7$-6$,-
        02AB        02AB        02AB        02AB    00175                   7$-6$,-
        02AB        02AB        02AB        02AB    0017D                   7$-6$,-
        02AB        02AB        02AB        02AB    00185                   7$-6$,-
        02AB        02AB        02AB        02AB    0018D                   7$-6$,-
        02AB        02AB        02AB        02AB    00195                   19$-6$,-
        02AB        0200        02AB        02AB    0019D                   19$-6$,-
        0200        02AB        02AB        02AB    001A5                   19$-6$,-
        02AB        02AB        02AB        0200    001AD                   19$-6$,-
        0200        02AB        02AB        02AB    001B5                   19$-6$,-
        02AB        02AB        02AB        02AB    001BD                   19$-6$,-
        02AB        0282        02AB        0200    001C5                   19$-6$,-
        0279        02AB        0200        02AB    001CD                   19$-6$,-
        02A2        0200        02AB        02A2    001D5                   19$-6$,-
        02AB        0200        02AB        02AB    001DD                   19$-6$,-
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        02AB        02AB        02AB        02AB    00215                   19$-6$,-
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                                                  19$-6$                                    ;
     50        10   A3  D0 00265 7$:      MOVL    16(R3), MODPTR                            ; 4765
```

```
                        51      02  A2  9E 00269          MOVAB   2(R2), R1                          ; 4773
                    1C  66          06  E1 0026D          BBC     #6, DBG$GV_CONTROL, 9$           ; 4766
                17  15  A3          06  E1 00271          BBC     #6, 21(R3), 9$                   ; 4767
                                    50  D5 00276          TSTL    MODPTR                           ; 4768
                                    13  13 00278          BEQL    9$                               ;
                0E  28  A0          03  E1 0027A          BBC     #3, 40(MODPTR), 9$               ; 4770
                            20      A0  D5 0027F          TSTL    32(MODPTR)                       ; 4771
                                    09  12 00282          BNEQ    9$                               ;
                                    01  DD 00284          PUSHL   #1                               ; 4773
                            0C      AC  DD 00286 8$:      PUSHL   VALKIND                          ; 4775
                                    12  BB 00289          PUSHR   #^M<R1,R4>                       ;
                                    4B  11 0028B          BRB     14$                              ;
                                    7E  D4 0028D 9$:      CLRL    -(SP)                            ; 4777
                                    F5  11 0028F          BRB     8$                               ;
                    04  AE      04  A2  90 00291 10$:     MOVB    4(DSTPTR), BLIVALSPEC            ; 4802
                        50      02  A2  9A 00296          MOVZBL  2(DSTPTR), R0                    ; 4803
                        50      03 A042 9E 0029A          MOVAB   3(R0)[DSTPTR], BLITRLR           ;
                    05  AE          60  D0 0029F          MOVL    (BLITRLR), BLIVALSPEC+1          ; 4804
                        50      04  AE  9E 002A3          MOVAB   BLIVALSPEC, VSPTR                ; 4820
                        03          60  93 002A7          BITB    (VSPTR), #3                      ; 4821
                                    05  12 002AA          BNEQ    11$                              ;
            60      02              01  F0 002AC          INSV    #1, #0, #2, (VSPTR)              ; 4823
                        50      10  A3  D0 002B1 11$:     MOVL    16(R3), MODPTR                   ; 4830
                    15  66          06  E1 002B5          BBC     #6, DBG$GV_CONTROL, 12$          ; 4831
                10  15  A3          06  E1 002B9          BBC     #6, 21(R3), 12$                  ; 4832
                                    0E  13 002BE          BEQL    12$                              ; 4833
                09  28  A0          03  E1 002C0          BBC     #3, 40(MODPTR), 12$              ; 4835
                            20      A0  D5 002C5          TSTL    32(MODPTR)                       ; 4836
                                    04  12 002C8          BNEQ    12$                              ;
                                    01  DD 002CA          PUSHL   #1                               ; 4838
                                    02  11 002CC          BRB     13$                              ; 4840
                                    7E  D4 002CE 12$:     CLRL    -(SP)                            ; 4842
                            0C      AC  DD 002D0 13$:     PUSHL   VALKIND                          ;
                                    54  DD 002D3          PUSHL   R4                               ;
                            10      AE  9F 002D5          PUSHAB  BLIVALSPEC                       ;
        0000V   CF                  04  FB 002D8 14$:     CALLS   #4, DBG$STA_VALSPEC              ;
                                        04 002DD          RET                                      ; 4745
                    64      03      A2  9E 002DE 15$:     MOVAB   3(R2), (R4)                      ; 4851
                0C  BC              01  D0 002E2          MOVL    #1, @VALKIND                     ; 4852
                                        04 002E6          RET                                      ; 4745
                        50      07  A2  9A 002E7 16$:     MOVZBL  7(DSTPTR), R0                    ; 4861
                        50      08 A042 9E 002EB          MOVAB   8(R0)[DSTPTR], CH_TRLR_PTR       ;
                                08  A4  9F 002F0          PUSHAB  8(R4)                            ; 4862
                                04  AE  9F 002F3          PUSHAB  VALLOC                           ;
                                01  A0  9F 002F6          PUSHAB  1(CH_TRLR_PTR)                   ;
        0000V   CF                  03  FB 002F9          CALLS   #3, STACK_MACHINE                ;
                    64          00  BE  D0 002FE          MOVL    @VALLOC, (R4)                    ; 4863
                                04  A4  D4 00302          CLRL    4(R4)                            ; 4864
                                    04  11 00305          BRB     18$                              ; 4865
                    64      03      A2  D0 00307 17$:     MOVL    3(DSTPTR), (R4)                  ; 4874
                0C  BC              02  D0 0030B 18$:     MOVL    #2, @VALKIND                     ; 4875
                                        04 0030F          RET                                      ; 4745
                        00000000'       EF  9F 00310 19$:     PUSHAB  P.ABF                        ; 4882
                                        01  DD 00316          PUSHL   #1                           ;
                        00028362        8F  DD 00318          PUSHL   #164706                      ;
                    65                  03  FB 0031E          CALLS   #3, LIB$SIGNAL               ;
                                        04 00321          RET                                      ; 4891
```

```
; Routine Size:  802 bytes,    Routine Base:  DBG$CODE + 1E5D
```

```
;  4789          4892  1 GLOBAL ROUTINE DBG$STA_UNLOCK_SYMID(SYMID_LIST_PTR): NOVALUE =
;  4790          4893  1 !
;  4791          4894  1 ! FUNCTION
;  4792          4895  1 !       This routine "unlocks" a list of SYMIDs which have previously been
;  4793          4896  1 !       "locked" in the RST by routine DBG$STA_LOCK_SYMID.  SYMIDs are locked
;  4794          4897  1 !       in the RST when the corresponding RST entries must be preserved accross
;  4795          4898  1 !       Debug commands because they are referenced by "." (current location),
;  4796          4899  1 !       breakpoints, or the like.  They should then be "unlocked" when they are
;  4797          4900  1 !       no longer so referenced, i.e. when "." assumes a different value or the
;  4798          4901  1 !       breakpoint is cancelled.
;  4799          4902  1 !
;  4800          4903  1 !       The unlocking is effected by decrementing the Reference Count in the
;  4801          4904  1 !       SYMID's RST entry and all other RST entries whose reference counts were
;  4802          4905  1 !       incremented when the SYMID was originally locked.  This includes all
;  4803          4906  1 !       RST entries up-scope from the original RST entry.
;  4804          4907  1 !
;  4805          4908  1 ! INPUTS
;  4806          4909  1 !       SYMID_LIST_PTR - A pointer to a linked list of Linked List Nodes, where
;  4807          4910  1 !                        each node contains a forward link and a SYMID value.  Each
;  4808          4911  1 !                        SYMID on the list is "unlocked" in the RST by decrementing the
;  4809          4912  1 !                        reference count of the corresponding RST entry.
;  4810          4913  1 !
;  4811          4914  1 ! OUTPUTS
;  4812          4915  1 !       NONE
;  4813          4916  1 !
;  4814          4917  1
;  4815          4918  2     BEGIN
;  4816          4919  2
;  4817          4920  2     LOCAL
;  4818          4921  2         LISTPTR: REF DBG$LINK_NODE;     ! Pointer to current linked list node
;  4819          4922  2
;  4820          4923  2
;  4821          4924  2
;  4822          4925  2     ! Loop through all the SYMIDs (i.e., RST pointers) on the linked list.
;  4823          4926  2     ! For each SYMID on the list, call ADD_TO_REF_COUNT to decrement the RST
;  4824          4927  2     ! entry's reference count.
;  4825          4928  2     !
;  4826          4929  2     LISTPTR = .SYMID_LIST_PTR;
;  4827          4930  2     WHILE .LISTPTR NEQ 0 DO
;  4828          4931  3         BEGIN
;  4829          4932  3         ADD_TO_REF_COUNT(.LISTPTR[DBG$L_LINK_NODE_VALUE], -1);
;  4830          4933  3         LISTPTR = .LISTPTR[DBG$L_LINK_NODE_LINK];
;  4831          4934  2         END;
;  4832          4935  2
;  4833          4936  2     RETURN;
;  4834          4937  2
;  4835          4938  1     END;


                                0004 00000          .ENTRY  DBG$STA_UNLOCK_SYMID, Save R2                   ; 4892
                     52   04 AC  D0 00002          MOVL    SYMID_LIST_PTR, LISTPTR                         ; 4929
                                10  13 00006 1$:    BEQL    2$                                              ; 4930
                     7E         01  CE 00008          MNEGL   #1, -(SP)                                       ; 4932
                           04   A2  DD 0000B          PUSHL   4(LISTPTR)                                      ;
```

```
                0000V  CF           02  FB 0000E        CALLS   #2, ADD_TO_REF_COUNT             ;
                       52           62  D0 00013        MOVL    (LISTPTR), LISTPTR              ; 4933
                                    EE  11 00016        BRB     1$                              ; 4930
                                        04 00018 2$:    RET                                     ; 4938

; Routine Size:  25 bytes,    Routine Base:  DBG$CODE + 217F
```

```
;  4837          4939  1 GLOBAL ROUTINE DBG$STA_VALSPEC(VALSPEC, VALPTR, VALKIND, ACTUAL_REG_FLAG): NOVALUE =
;  4838          4940  1 !
;  4839          4941  1 ! FUNCTION
;  4840          4942  1 !       This routine accepts the address of a DST Value Spec as input and pro-
;  4841          4943  1 !       duces the corresponding value as output.  It handles all the special
;  4842          4944  1 !       cases of value specs, including stack machine value specs, to compute
;  4843          4945  1 !       the proper output value.  It requires a "context" to have been estab-
;  4844          4946  1 !       lished by DBG$STA_SETCONTEXT if there are any register references in
;  4845          4947  1 !       the value spec.  If such a reference occurs and no context exists, an
;  4846          4948  1 !       error is signalled.
;  4847          4949  1 !
;  4848          4950  1 ! INPUTS
;  4849          4951  1 !       VALSPEC - A pointer to the DST Value Spec to be evaluated.
;  4850          4952  1 !
;  4851          4953  1 !       VALPTR  - The address of a three-longword vector to receive the value
;  4852          4954  1 !                 pointer and the corresponding stack frame pointer.
;  4853          4955  1 !
;  4854          4956  1 !       VALKIND - The address of a longword location to receive the value kind.
;  4855          4957  1 !
;  4856          4958  1 !       ACTUAL_REG_FLAG - This is a flag indicating that the valspec that we are
;  4857          4959  1 !                         looking at is an actual register (e.g. %R5)
;  4858          4960  1 !
;  4859          4961  1 ! OUTPUTS
;  4860          4962  1 !       VALPTR  - A pointer to the desired value is returned to VALPTR.  The
;  4861          4963  1 !                 byte address of the value is returned to VALPTR[0] and the
;  4862          4964  1 !                 bit offset from that address is returned to VALPTR[1].  The
;  4863          4965  1 !                 corresponding stack Frame Pointer is returned to VALPTR[2].
;  4864          4966  1 !                 VALPTR[2] will contain zero if no frame pointer is applicable.
;  4865          4967  1 !
;  4866          4968  1 !       VALKIND - The kind of the value pointed to by VALPTR is returned to
;  4867          4969  1 !                 VALKIND.  These are the possible values:
;  4868          4970  1 !
;  4869          4971  1 !                       DBG$K_VAL_LITERAL - VALPTR points to a literal value.
;  4870          4972  1 !                       DBG$K_VAL_ADDR    - VALPTR contains an address.
;  4871          4973  1 !                       DBG$K_VAL_DESCR   - VALPTR contains the address of a
;  4872          4974  1 !                                           descriptor.
;  4873          4975  1 !
;  4874          4976  1
;  4875          4977  2     BEGIN
;  4876          4978  2
;  4877          4979  2     MAP
;  4878          4980  2         VALSPEC: REF DST$VAL_SPEC,      ! Pointer to DST Value Spec to evaluate
;  4879          4981  2         VALPTR: REF VECTOR[3],          ! Pointer to value return location
;  4880          4982  2         VALKIND: REF VECTOR[1];         ! Pointer to value kind return location
;  4881          4983  2
;  4882          4984  2     LOCAL
;  4883          4985  2         REG_FLAG,
;  4884          4986  2         REGNUM,                         ! Register number
;  4885          4987  2         REGPTR: REF VECTOR[,LONG],      ! Pointer to register save location
;  4886          4988  2         VALUE: REF VECTOR[,LONG],       ! Computed value
;  4887          4989  2         VSPTR: REF DST$VAL_SPEC;        ! Pointer to current DST Value Spec
;  4888          4990  2
;  4889          4991  2     ENABLE
;  4890          4992  2         VALSPEC_ERROR_HANDLER;          ! Set up error handler for this routine
;  4891          4993  2
;  4892          4994  2     BUILTIN
;  4893          4995  2         ACTUALCOUNT;
```

```
;  4894          4996  2
;  4895          4997  2
;  4896          4998  2      ! Default fourth parameter to FALSE.
;  4897          4999  2      !
;  4898          5000  2      IF ACTUALCOUNT() GEQ 4
;  4899          5001  2      THEN
;  4900          5002  2          REG_FLAG = .ACTUAL_REG_FLAG
;  4901          5003  2      ELSE
;  4902          5004  2          REG_FLAG = FALSE;
;  4903          5005  2
;  4904          5006  2
;  4905          5007  2      ! Initially zero the returned frame pointer value in VALPTR[2].  This
;  4906          5008  2      ! value will be changed later if a register is used in the evaluation.
;  4907          5009  2      !
;  4908          5010  2      VALPTR[2] = 0;
;  4909          5011  2
;  4910          5012  2
;  4911          5013  2      ! If the value is given by a trailing Value Spec, we get to that Value
;  4912          5014  2      ! Spec.  We loop in case the indirection is repeated.
;  4913          5015  2      !
;  4914          5016  2      VSPTR = .VALSPEC;
;  4915          5017  2      WHILE .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_TVS DO
;  4916          5018  2          VSPTR = VSPTR[DST$A_VS_TVS_BASE] + .VSPTR[DST$L_VS_TVS_OFFSET];
;  4917          5019  2
;  4918          5020  2
;  4919          5021  2      ! If the Value Spec gives the offset to a descriptor (in the DST), return
;  4920          5022  2      ! the address of that descriptor to the caller.
;  4921          5023  2      !
;  4922          5024  2      IF .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_DSC
;  4923          5025  2      THEN
;  4924          5026  3          BEGIN
;  4925          5027  3          VALPTR[0] = VSPTR[DST$A_VS_DSC_BASE] + .VSPTR[DST$L_VS_DSC_OFFS];
;  4926          5028  3          VALPTR[1] = 0;
;  4927          5029  3          VALKIND[0] = DBG$K_VAL_DESCR;
;  4928          5030  3          RETURN;
;  4929          5031  2          END;
;  4930          5032  2
;  4931          5033  2
;  4932          5034  2      ! If this is a Bit Offset Value Spec, return that bit offset as a byte
;  4933          5035  2      ! address plus bit offset to the caller.
;  4934          5036  2      !
;  4935          5037  2      IF .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_BITOFFS
;  4936          5038  2      THEN
;  4937          5039  3          BEGIN
;  4938          5040  3          VALPTR[0] = .VSPTR[DST$L_VS_VALUE]/8;
;  4939          5041  3          VALPTR[1] = .VSPTR[DST$L_VS_VALUE] AND 7;
;  4940          5042  3          VALKIND[0] = DBG$K_VAL_ADDR;
;  4941          5043  3          RETURN;
;  4942          5044  2          END;
;  4943          5045  2
;  4944          5046  2
;  4945          5047  2      ! If the VFLAGS field has the special code for "unallocated", then
;  4946          5048  2      ! put the code for "unallocated" in the kind field and then
;  4947          5049  2      ! return. This is the case, for example, for PASCAL variables
;  4948          5050  2      ! that are never referenced.
;  4949          5051  2      !
;  4950          5052  2      IF .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VFLAGS_UNALLOC
```

```
;  4951          5053  2     THEN
;  4952          5054  3         BEGIN
;  4953          5055  3         VALPTR[0] = 0;
;  4954          5056  3         VALPTR[1] = 0;
;  4955          5057  3         VALKIND[0] = DBG$K_VAL_UNALLOC;
;  4956          5058  3         RETURN;
;  4957          5059  2         END;
;  4958          5060  2
;  4959          5061  2
;  4960          5062  2     ! If this is a Value-Spec-Follows value spec, a more complex value spec
;  4961          5063  2     ! follows the VFLAGS field.  Here we handle those kinds of value specs.
;  4962          5064  2     !
;  4963          5065  2     IF .VSPTR[DST$B_VS_VFLAGS] EQL DST$K_VS_FOLLOWS
;  4964          5066  2     THEN
;  4965          5067  3         BEGIN
;  4966          5068  3
;  4967          5069  3
;  4968          5070  3         ! Sort out which particular kind of complex value specification follows.
;  4969          5071  3         !
;  4970          5072  3         CASE .VSPTR[DST$B_VS_ALLOC] FROM DST$K_VS_ALLOC_STAT TO DST$K_VS_ALLOC_DYN OF
;  4971          5073  3             SET
;  4972          5074  3
;  4973          5075  3
;  4974          5076  3             ! Handle statically or dynamically allocated objects without Binding
;  4975          5077  3             ! Specs.  Here we just evaluate the Materialization Spec.
;  4976          5078  3             !
;  4977          5079  3             [DST$K_VS_ALLOC_STAT,
;  4978          5080  3              DST$K_VS_ALLOC_DYN]:
;  4979          5081  4                 BEGIN
;  4980          5082  4                 EVAL_MAT_SPEC(VSPTR[DST$A_VS_MATSPEC], .VALPTR, .VALKIND);
;  4981          5083  3                 END;
;  4982          5084  3
;  4983          5085  3
;  4984          5086  3             ! Any other value in the DST$B_VS_ALLOC field is an error.
;  4985          5087  3             !
;  4986          5088  3             [INRANGE, OUTRANGE]:
;  4987          5089  3                 SIGNAL(DBG$_INVDSTREC);
;  4988          5090  3
;  4989          5091  3             TES;
;  4990          5092  3
;  4991          5093  3
;  4992          5094  3         ! We are done with the complex value spec.  Return to the caller.
;  4993          5095  3         !
;  4994          5096  3         RETURN;
;  4995          5097  2         END;
;  4996          5098  2
;  4997          5099  2
;  4998          5100  2     ! This is an ordinary garden variety Value Spec with a normal VFLAGS field
;  4999          5101  2     ! and a normal VALUE field.  If this is a literal, return the address of the
;  5000          5102  2     ! literal to the caller.
;  5001          5103  2     !
;  5002          5104  2     IF .VSPTR[DST$V_VS_VALKIND] EQL DST$K_VALKIND_LITERAL
;  5003          5105  2     THEN
;  5004          5106  3         BEGIN
;  5005          5107  3         VALPTR[0] = VSPTR[DST$L_VS_VALUE];
;  5006          5108  3         VALPTR[1] = 0;
;  5007          5109  3         VALKIND[0] = DBG$K_VAL_LITERAL;
```

```
;  5008          5110  3          RETURN;
;  5009          5111  2          END;
;  5010          5112  2
;  5011          5113  2
;  5012          5114  2      ! If this is a register number, return the address of the corresponding
;  5013          5115  2      ! register save area.  If the register is not available in this context,
;  5014          5116  2      ! signal an error.  (Note that we allow register 16 to mean the PSL.)
;  5015          5117  2      !
;  5016          5118  2      IF .VSPTR[DST$V_VS_VALKIND] EQL DST$K_VALKIND_REG
;  5017          5119  2      THEN
;  5018          5120  3          BEGIN
;  5019          5121  3          REGNUM = .VSPTR[DST$L_VS_VALUE];
;  5020          5122  3          IF (.REGNUM LSS 0) OR (.REGNUM GTR 16) THEN SIGNAL(DBG$_INVDSTREC);
;  5021          5123  3          IF .DBG$REG_VECTOR[.REGNUM] EQL 0 AND NOT .REG_FLAG
;  5022          5124  3          THEN
;  5023          5125  4              VALSPEC_SCOPE_ERROR();
;  5024          5126  3          VALPTR[0] = DBG$REG_VALUES[.REGNUM];
;  5025          5127  3          VALPTR[1] = 0;
;  5026          5128  3          VALPTR[2] = .DBG$REG_VALUES[13];
;  5027          5129  3          VALKIND[0] = DBG$K_VAL_ADDR;
;  5028          5130  3          RETURN;
;  5029          5131  2          END;
;  5030          5132  2
;  5031          5133  2
;  5032          5134  2      ! This value spec requires the value to be computed.  The resulting value is
;  5033          5135  2      ! either the address of some object or the address of a descriptor.
;  5034          5136  2      !
;  5035          5137  2      VALUE = .VSPTR[DST$L_VS_VALUE];
;  5036          5138  2      IF .VSPTR[DST$V_VS_DISP]
;  5037          5139  2      THEN
;  5038          5140  3          BEGIN
;  5039          5141  3          REGNUM = .VSPTR[DST$V_VS_REGNUM];
;  5040          5142  3          IF .DBG$REG_VECTOR[.REGNUM] EQL 0 THEN VALSPEC_SCOPE_ERROR();
;  5041          5143  3          VALUE = .VALUE + .DBG$REG_VALUES[.REGNUM];
;  5042          5144  3          VALPTR[2] = .DBG$REG_VALUES[13];
;  5043          5145  2          END;
;  5044          5146  2
;  5045          5147  2      IF .VSPTR[DST$V_VS_INDIRECT] THEN VALUE = .VALUE[0];
;  5046          5148  2
;  5047          5149  2
;  5048          5150  2      ! Return the computed value and its kind: address or descriptor address.
;  5049          5151  2      !
;  5050          5152  2      VALPTR[0] = .VALUE;
;  5051          5153  2      VALPTR[1] = 0;
;  5052          5154  2      IF .VSPTR[DST$V_VS_VALKIND] EQL DST$K_VALKIND_DESC
;  5053          5155  2      THEN
;  5054          5156  2          VALKIND[0] = DBG$K_VAL_DESCR
;  5055          5157  2
;  5056          5158  2      ELSE
;  5057          5159  2          VALKIND[0] = DBG$K_VAL_ADDR;
;  5058          5160  2
;  5059          5161  2      RETURN;
;  5060          5162  2
;  5061          5163  1      END;
```

```
                                    01FC 00000          .ENTRY  DBG$STA_VALSPEC, Save R2,R3,R4,R5,R6,R7,R8 ; 4939
                            58 00000000G  00    9E 00002  MOVAB   LIB$SIGNAL, R8                          ;
                            57 00000000G  00    9E 00009  MOVAB   DBG$REG_VECTOR, R7                     ;
                            56 00000000G  00    9E 00010  MOVAB   DBG$REG_VALUES, R6                     ;
                            6D     010C   CF    DE 00017  MOVAL   22$, (FP)                              ; 4977
                            04            6C    91 0001C  CMPB    (AP), #4                               ; 5000
                                          06    1F 0001F  BLSSU   1$                                     ;
                            55      10    AC    D0 00021  MOVL    ACTUAL_REG_FLAG, REG_FLAG              ; 5002
                                          02    11 00025  BRB     2$                                     ;
                                          55    D4 00027  1$:     CLRL    REG_FLAG                       ; 5004
                            54      08    AC    D0 00029  2$:     MOVL    VALPTR, R4                     ; 5010
                                    08    A4    D4 0002D  CLRL    8(R4)                                  ;
                            52      04    AC    D0 00030  MOVL    VALSPEC, VSPTR                         ; 5016
                        FB  8F            62    91 00034  3$:     CMPB    (VSPTR), #251                  ; 5017
                                          0B    12 00038  BNEQ    4$                                     ;
                50          52      01    A2    C1 0003A  ADDL3   1(VSPTR), VSPTR, R0                    ; 5018
                            52      05    A0    9E 0003F  MOVAB   5(R0), VSPTR                           ;
                                          EF    11 00043  BRB     3$                                     ;
                        FA  8F            62    91 00045  4$:     CMPB    (VSPTR), #250                  ; 5024
                                          0F    12 00049  BNEQ    5$                                     ;
                50          52      01    A2    C1 0004B  ADDL3   1(VSPTR), VSPTR, R0                    ; 5027
                            64      05    A0    9E 00050  MOVAB   5(R0), (R4)                            ;
                                    04    A4    D4 00054  CLRL    4(R4)                                  ; 5028
                                  00C3    31 00057  BRW     20$                                    ; 5029
                        FF  8F            62    91 0005A  5$:     CMPB    (VSPTR), #255                  ; 5037
                                          0E    12 0005E  BNEQ    6$                                     ;
                64      01    A2          08    C7 00060  DIVL3   #8, 1(VSPTR), (R4)                     ; 5040
    04  A4          01  A2              03    00    EF 00065  EXTZV   #0, #3, 1(VSPTR), 4(R4)              ; 5041
                                          79    11 0006C  BRB     15$                                    ; 5042
                        F9  8F            62    91 0006E  6$:     CMPB    (VSPTR), #249                  ; 5052
                                          07    12 00072  BNEQ    7$                                     ;
                                          64    7C 00074  CLRQ    (R4)                                   ; 5055
                        0C  BC            04    D0 00076  MOVL    #4, @VALKIND                           ; 5057
                                          04    0007A     RET                                          ; 5054
                        FD  8F            62    91 0007B  7$:     CMPB    (VSPTR), #253                  ; 5065
                                          21    12 0007F  BNEQ    10$                                    ;
            01              01      03    A2    8F 00081  CASEB   3(VSPTR), #1, #1                       ; 5072
                      000E          000E        00086  8$:     .WORD   9$-8$,-                            ;
                                                           9$-8$                                        ;
                    0002832A      8F    DD 0008A  PUSHL   #164650                                        ; 5089
                            68            01    FB 00090  CALLS   #1, LIB$SIGNAL                         ;
                                          04    00093     RET                                          ;
                                    0C    AC    DD 00094  9$:     PUSHL   VALKIND                        ; 5082
                                          54    DD 00097  PUSHL   R4                                     ;
                                    04    A2    9F 00099  PUSHAB  4(VSPTR)                               ;
                    0000V           CF          03    FB 0009C  CALLS   #3, EVAL_MAT_SPEC                ;
                                          04    000A1     RET                                          ; 5067
                                    03          62    93 000A2  10$:    BITB    (VSPTR), #3            ; 5104
                                          0C    12 000A5  BNEQ    11$                                    ;
                            64      01    A2    9E 000A7  MOVAB   1(R2), (R4)                            ; 5107
                                    04    A4    D4 000AB  CLRL    4(R4)                                  ; 5108
                        0C  BC            01    D0 000AE  MOVL    #1, @VALKIND                           ; 5109
                                          04    000B2     RET                                          ; 5106
    03          62              02          00    ED 000B3  11$:    CMPZV   #0, #2, (VSPTR), #3            ; 5118
                                          2F    12 000B8  BNEQ    16$                                    ;
```

```
                        53        01    A2  D0 000BA          MOVL    1(VSPTR), REGNUM                        ; 5121
                                        05  19 000BE          BLSS    12$                                     ; 5122
                        10              53  D1 000C0          CMPL    REGNUM, #16                             ;
                                        09  15 000C3          BLEQ    13$                                     ;
                            0002832A    8F  DD 000C5 12$:     PUSHL   #164650                                 ;
                        68              01  FB 000CB          CALLS   #1, LIB$SIGNAL                          ;
                                      6743  D5 000CE 13$:     TSTL    DBG$REG_VECTOR[REGNUM]                  ; 5123
                                        08  12 000D1          BNEQ    14$                                     ;
                        05              55  E8 000D3          BLBS    REG_FLAG, 14$                           ;
                  0000v CF              00  FB 000D6          CALLS   #0, VALSPEC_SCOPE_ERROR                 ; 5125
                        64            6643  DE 000DB 14$:     MOVAL   DBG$REG_VALUES[REGNUM], (R4)            ; 5126
                                04      A4  D4 000DF          CLRL    4(R4)                                   ; 5127
                     08 A4              34  A6 000E2          MOVL    DBG$REG_VALUES+52, 8(R4)                ; 5128
                                        39  11 000E7 15$:     BRB     21$                                     ; 5129
                        55              01  A2 D0 000E9 16$:  MOVL    1(VSPTR), VALUE                         ; 5137
                  18    62                  03 E1 000ED       BBC     #3, (VSPTR), 18$                        ; 5138
            53    62    04                  EF 000F1          EXTZV   #4, #4, (VSPTR), REGNUM                 ; 5141
                                      6743  D5 000F6          TSTL    DBG$REG_VECTOR[REGNUM]                  ; 5142
                                        05  12 000F9          BNEQ    17$                                     ;
                  0000v CF                  00 FB 000FB       CALLS   #0, VALSPEC_SCOPE_ERROR                 ;
                        55            6643  C0 00100 17$:     ADDL2   DBG$REG_VALUES[REGNUM], VALUE           ; 5143
                     08 A4              34  A6 D0 00104       MOVL    DBG$REG_VALUES+52, 8(R4)                ; 5144
                  03    62                  02 E1 00109 18$:  BBC     #2, (VSPTR), 19$                        ; 5147
                        55                  65 D0 0010D       MOVL    (VALUE), VALUE                          ;
                        64                  55 D0 00110 19$:  MOVL    VALUE, (R4)                             ; 5152
                                04      A4  D4 00113          CLRL    4(R4)                                   ; 5153
            02    62    02                  00 ED 00116       CMPZV   #0, #2, (VSPTR), #2                     ; 5154
                                        05  12 0011B          BNEQ    21$                                     ;
                     0C BC                  03 D0 0011D 20$:  MOVL    #3, @VALKIND                            ; 5156
                                            04 00121          RET                                             ;
                     0C BC                  02 D0 00122 21$:  MOVL    #2, @VALKIND                            ; 5159
                                            04 00126          RET                                             ; 5163
                                          0000 00127 22$:     .WORD   Save nothing                            ; 4977
                                      7E  D4 00129          CLRL    -(SP)                                   ;
                                      5E  DD 0012B          PUSHL   SP                                      ;
                        7E        04  AC  7D 0012D          MOVQ    4(AP), -(SP)                            ;
                  0000v CF              03  FB 00131          CALLS   #3, VALSPEC_ERROR_HANDLER               ;
                                            04 00136          RET                                             ;

; Routine Size:  311 bytes,    Routine Base:  DBG$CODE + 2198
```

```
;  5063          5164  1 GLOBAL ROUTINE DBG$STA_VARIANT_SELECT(TAGVALUE, VARSYMID) =
;  5064          5165  1 !
;  5065          5166  1 ! FUNCTION
;  5066          5167  1 !       This routine accepts a tag value, i.e. the value of the tag variable
;  5067          5168  1 !       in a record with variants (as in PASCAL or ADA), and a pointer to a
;  5068          5169  1 !       Variant Set RST Entry and it returns a pointer to the corresponding
;  5069          5170  1 !       variant in the Variant Set is selected by that tag value.  If no
;  5070          5171  1 !       variant is selected, meaning that the tag variable has an invalid
;  5071          5172  1 !       value, a value of zero is returned.  This is achieved by looping
;  5072          5173  1 !       over all the variants in the set and calling DBG$STA_VARIANT_VALUE
;  5073          5174  1 !       for each variant to determine if the tag value selects that variant.
;  5074          5175  1 !
;  5075          5176  1 ! INPUTS
;  5076          5177  1 !       TAGVALUE - The value of the tag variable to be used to select a
;  5077          5178  1 !                  variant in the Variant Set.  This is treated as a longword
;  5078          5179  1 !                  integer value.
;  5079          5180  1 !
;  5080          5181  1 !       VARSYMID - A pointer to the Variant Set RST Entry for the Variant
;  5081          5182  1 !                  Set from which a specific variant is to be selected by
;  5082          5183  1 !                  TAGVALUE.
;  5083          5184  1 !
;  5084          5185  1 ! OUTPUTS
;  5085          5186  1 !       An pointer to the variant entry (obtained from the list in the Variant Set
;  5086          5187  1 !       RST Entry) is returned as the routine value.    If no variant was selected
;  5087          5188  1 !       (invalid tag variable value), zero is returned.
;  5088          5189  1 !
;  5089          5190  1
;  5090          5191  2     BEGIN
;  5091          5192  2
;  5092          5193  2     MAP
;  5093          5194  2         VARSYMID: REF RST$ENTRY;          ! Pointer to Variant Set RST Entry
;  5094          5195  2
;  5095          5196  2     LOCAL
;  5096          5197  2         VARPTR: REF RST$VAR_ENTRY,        ! Pointer to current RST Variant Entry
;  5097          5198  2         VARSETTBL: REF VECTOR[,LONG];     ! Pointer to Variant Set RST Entry's
;  5098          5199  2                                           !      pointer table, where each entry
;  5099          5200  2                                           !      points to an RST Variant Entry
;  5100          5201  2
;  5101          5202  2
;  5102          5203  2
;  5103          5204  2     ! Check the Variant Set RST Entry pointer for validity.
;  5104          5205  2     !
;  5105          5206  2     IF .VARSYMID[RST$B_KIND] NEQ RST$K_VARIANT
;  5106          5207  2     THEN
;  5107          5208  2         $DBG_ERROR('RSTACCESS\VARIANT_INDEX');
;  5108          5209  2
;  5109          5210  2
;  5110          5211  2     ! Search through the Variant Set RST Entry's table of variants.  For each
;  5111          5212  2     ! variant, see if TAGVALUE falls into one of its tag value ranges, and if
;  5112          5213  2     ! so, return the index of that variant.
;  5113          5214  2     !
;  5114          5215  2     VARSETTBL = VARSYMID[RST$A_VARSETTBL];
;  5115          5216  2     INCR I FROM 0 TO .VARSYMID[RST$L_VARSETCNT] - 1 DO
;  5116          5217  3         BEGIN
;  5117          5218  3         VARPTR = .VARSETTBL[.I];
;  5118          5219  3         IF DBG$STA_VARIANT_VALUE(.TAGVALUE, .VARPTR[RST$L_VAR_DSTPTR])
;  5119          5220  3         THEN
```

```
;  5120          5221  3            RETURN .VARPTR;
;  5121          5222  2        END;
;  5122          5223  2
;  5123          5224  2
;  5124          5225  2        ! The tag value does not match the allowed tag values for any variant.
;  5125          5226  2        ! We return a value of 0 to indicate that the tag value is invalid.
;  5126          5227  2        !
;  5127          5228  2        RETURN 0;
;  5128          5229  2
;  5129          5230  1        END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

49  52  41  56  5C  53  53  45  43  43  41  54  53  52  17  00253 P.ABG:  .ASCII  <23>\RSTACCESS\<92>\VARIANT_INDEX\          ;
                    58  45  44  4E  49  5F  54  4E  41  00262                                                               ;


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                        003C 00000              .ENTRY  DBG$STA_VARIANT_SELECT, Save R2,R3,R4,R5    ; 5164
                                54       08   AC   D0 00002     MOVL    VARSYMID, R4                               ; 5206
                                0B       14   A4   91 00006     CMPB    20(R4), #11                                ;
                                              15   13 0000A     BEQL    1$                                         ;
                                   00000000'  EF   9F 0000C     PUSHAB  P.ABG                                      ; 5208
                                              01   DD 00012     PUSHL   #1                                         ;
                                   00028362   8F   DD 00014     PUSHL   #164706                                    ;
                          00000000G  00              03   FB 0001A     CALLS   #3, LIB$SIGNAL                     ;
                                     52       18   A4   9E 00021 1$:  MOVAB   24(R4), VARSETTBL                  ; 5215
                                     53            01   CE 00025     MNEGL   #1, I                              ; 5219
                                                   15   11 00028     BRB     3$                                 ;
                                     55         6243   D0 0002A 2$:  MOVL    (VARSETTBL)[I], VARPTR             ; 5218
                                                65   DD 0002E     PUSHL   (VARPTR)                           ; 5219
                                              04   AC   DD 00030     PUSHL   TAGVALUE                           ;
                                    0000V     CF         02   FB 00033     CALLS   #2, DBG$STA_VARIANT_VALUE          ;
                                              04         50   E9 00038     BLBC    R0, 3$                             ;
                                              50         55   D0 0003B     MOVL    VARPTR, R0                         ; 5221
                                                         04   00003E      RET                                        ;
                                E6            53       08   A4   F2 0003F 3$:  AOBLSS  8(R4), I, 2$               ; 5216
                                                       50   D4 00044     CLRL    R0                                 ; 5228
                                                         04   00046      RET                                        ; 5230

; Routine Size:  71 bytes,    Routine Base:  DBG$CODE + 22CF
```

```
;  5131          5231  1 GLOBAL ROUTINE DBG$STA_VARIANT_VALUE(TAGVALUE, VARDSTPTR) =
;  5132          5232  1 !
;  5133          5233  1 ! FUNCTION
;  5134          5234  1 !       This routine determines whether a given tag variable value selects a
;  5135          5235  1 !       specified record variant or not.  This is done by looping through all
;  5136          5236  1 !       the Tag Value Range Specifications in the variant's Variant Value DST
;  5137          5237  1 !       Record until a tag value or tag value range is found which equals or
;  5138          5238  1 !       includes the specified tag variable value.  If such a match is found,
;  5139          5239  1 !       this routine returns TRUE; otherwise it returns FALSE.
;  5140          5240  1 !
;  5141          5241  1 ! INPUTS
;  5142          5242  1 !       TAGVALUE - The tag variable value.  This value, treated as a longword
;  5143          5243  1 !                  integer, is compared to all the tag value ranges in the
;  5144          5244  1 !                  Variant Value DST Record.
;  5145          5245  1 !
;  5146          5246  1 !       VARDSTPTR - A pointer to the Variant Value DST Record for the variant
;  5147          5247  1 !                  of interest.  The Tag Value Range Specifications against
;  5148          5248  1 !                  which TAGVALUE is checked is taken from this DST record.
;  5149          5249  1 !
;  5150          5250  1 ! OUTPUTS
;  5151          5251  1 !       If TAGVALUE selects the VARDSTPTR variant, this routine returns TRUE
;  5152          5252  1 !                  as its value; otherwise FALSE is returned.
;  5153          5253  1 !
;  5154          5254  1
;  5155          5255  2     BEGIN
;  5156          5256  2
;  5157          5257  2     MAP
;  5158          5258  2         VARDSTPTR: REF DST$RECORD;      ! Pointer to Variant Value DST Record
;  5159          5259  2
;  5160          5260  2     LOCAL
;  5161          5261  2         HIGHBOUND,                      ! Upper bound given by the current Tag
;  5162          5262  2                                         !      Value Range Specification
;  5163          5263  2         LOWBOUND,                       ! Lower bound given by the current Tag
;  5164          5264  2                                         !      Value Range Specification
;  5165          5265  2         RANGESPEC: REF VECTOR[,BYTE],   ! Pointer to DST Tag Value Range Spec
;  5166          5266  2         VALKIND,                        ! Value kind returned by DBG$STA_VALSPEC
;  5167          5267  2         VALPTR: VECTOR[3],              ! Value pointer returned by STA_VALSPEC
;  5168          5268  2         VALSPEC: REF DST$VAL_SPEC,      ! Pointer to current DST Value Spec in
;  5169          5269  2                                         !      the current Tag Value Range Spec
;  5170          5270  2         VALUEPTR: REF VECTOR[1],        ! Pointer to the actual tag value given
;  5171          5271  2                                         !      by current Value Spec
;  5172          5272  2         VS_LENGTH;                      ! Value Specification length (used to
;  5173          5273  2                                         !      find address of next Value Spec)
;  5174          5274  2
;  5175          5275  2
;  5176          5276  2
;  5177          5277  2     ! Check the Variant Value DST Record pointer for validity.
;  5178          5278  2     !
;  5179          5279  2     IF .VARDSTPTR[DST$B_TYPE] NEQ DST$K_VARVAL
;  5180          5280  2     THEN
;  5181          5281  2         $DBG_ERROR('RSTACCESS\VARIANT_VALUE');
;  5182          5282  2
;  5183          5283  2
;  5184          5284  2     ! Loop through all the Tag Value Range Specs for this particular variant.
;  5185          5285  2     ! If one of those values or value ranges matches the TAGVALUE parameter,
;  5186          5286  2     ! then we return TRUE, meaning that the specified tag value selects this
;  5187          5287  2     ! particular variant.
```

```
;  5188          5288  2     !
;  5189          5289  2     RANGESPEC = VARDSTPTR[DST$A_VARVAL_RNGSPEC];
;  5190          5290  2     INCR I FROM 0 TO .VARDSTPTR[DST$W_VARVAL_COUNT] - 1 DO
;  5191          5291  2         BEGIN
;  5192          5292  2
;  5193          5293  2
;  5194          5294  2         ! Pick up the first (and possibly only) value in the current Tag Value
;  5195          5295  2         ! Range Specification.  Then advance VALSPEC past that Value Spec.
;  5196          5296  2         !
;  5197          5297  2         VALSPEC = RANGESPEC[1];
;  5198          5298  2         DBG$STA_VALSPEC(.VALSPEC, VALPTR, VALKIND);
;  5199          5299  2         VALUEPTR = .VALPTR[0];
;  5200          5300  2         LOWBOUND = .VALUEPTR[0];
;  5201          5301  2         HIGHBOUND = .VALUEPTR[0];
;  5202          5302  2         VS_LENGTH = 5;
;  5203          5303  2         IF .VALSPEC[DST$B_VS_VFLAGS] EQL DST$K_VS_FOLLOWS
;  5204          5304  2         THEN
;  5205          5305  2             VS_LENGTH = .VALSPEC[DST$W_VS_LENGTH] + 3;
;  5206          5306  2
;  5207          5307  2         VALSPEC = .VALSPEC + .VS_LENGTH;
;  5208          5308  2
;  5209          5309  2
;  5210          5310  2         ! If this Tag Value Range Specification actually specifies a range,
;  5211          5311  2         ! we just got the lower bound of that range.  Now pick up the upper
;  5212          5312  2         ! bound of the range.
;  5213          5313  2         !
;  5214          5314  2         IF .RANGESPEC[0] EQL DST$K_VARVAL_RANGE
;  5215          5315  3         THEN
;  5216          5316  4             BEGIN
;  5217          5317  4             DBG$STA_VALSPEC(.VALSPEC, VALPTR, VALKIND);
;  5218          5318  4             VALUEPTR = .VALPTR[0];
;  5219          5319  4             HIGHBOUND = .VALUEPTR[0];
;  5220          5320  4             VS_LENGTH = 5;
;  5221          5321  4             IF .VALSPEC[DST$B_VS_VFLAGS] EQL DST$K_VS_FOLLOWS
;  5222          5322  4             THEN
;  5223          5323  4                 VS_LENGTH = .VALSPEC[DST$W_VS_LENGTH] + 3;
;  5224          5324  4
;  5225          5325  4             VALSPEC = .VALSPEC + .VS_LENGTH;
;  5226          5326  3             END;
;  5227          5327  3
;  5228          5328  3
;  5229          5329  3         ! See if the specified tag variable value is in the value range speci-
;  5230          5330  3         ! fied by the current Tag Value Range Specification.  If so, return
;  5231          5331  3         ! TRUE.  Otherwise, advance the RANGESPEC pointer to the next Tag Value
;  5232          5332  3         ! Range Specification and loop.
;  5233          5333  3         !
;  5234          5334  4         IF (.TAGVALUE GEQ .LOWBOUND) AND (.TAGVALUE LEQ .HIGHBOUND)
;  5235          5335  3         THEN
;  5236          5336  3             RETURN TRUE;
;  5237          5337  3
;  5238          5338  3         RANGESPEC = .VALSPEC;
;  5239          5339  2         END;                                ! End of loop over Tag Value Range Specs
;  5240          5340  2
;  5241          5341  2
;  5242          5342  2     ! The specified TAGVALUE does not select this particular variant, so we
;  5243          5343  2     ! return FALSE.
;  5244          5344  2     !
```

```
;  5245          5345  2     RETURN FALSE;
;  5246          5346  2
;  5247          5347  1     END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

49 52 41 56 5C 53 53 45 43 43 41 54 53 52 17  0026B P.ABH:  .ASCII  <23>\RSTACCESS\<92>\VARIANT_VALUE\          ;
                  45 55 4C 41 56 5F 54 4E 41  0027A                                                          ;


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                        03FC 00000      .ENTRY  DBG$STA_VARIANT_VALUE, Save R2,R3,R4,R5,R6,-; 5231
                                                                R7,R8,R9                                    ;
                                  5E    10   C2 00002      SUBL2   #16, SP                                 ;
                                  52 08 AC   D0 00005      MOVL    VARDSTPTR, R2                           ; 5279
                               9D 8F 01 A2   91 00009      CMPB    1(R2), #157                             ;
                                     15   13 0000E        BEQL    1$                                      ;
                          00000000' EF   9F 00010        PUSHAB  P.ABH                                   ; 5281
                                  01   DD 00016        PUSHL   #1                                      ;
                          00028362 8F   DD 00018        PUSHL   #164706                                 ;
                    00000000G  00 03   FB 0001E        CALLS   #3, LIB$SIGNAL                          ;
                                  53 08 A2   9E 00025 1$:    MOVAB   8(R2), RANGESPEC                    ; 5289
                                  58 06 A2   3C 00029        MOVZWL  6(R2), R8                           ; 5290
                                  56    01   CE 0002D        MNEGL   #1, I                               ; 5334
                                        6B   11 00030        BRB     7$                                  ;
                                  52 01 A3   9E 00032 2$:    MOVAB   1(R3), VALSPEC                      ; 5297
                                        5E   DD 00036        PUSHL   SP                                  ; 5298
                                     08 AE   9F 00038        PUSHAB  VALPTR                              ;
                                        52   DD 0003B        PUSHL   VALSPEC                             ;
                                FE40 CF      03   FB 0003D        CALLS   #3, DBG$STA_VALSPEC             ;
                                  55 04 AE   D0 00042        MOVL    VALPTR, VALUEPTR                    ; 5299
                                  59    65   D0 00046        MOVL    (VALUEPTR), LOWBOUND                ; 5300
                                  57    65   D0 00049        MOVL    (VALUEPTR), HIGHBOUND               ; 5301
                                  54    05   D0 0004C        MOVL    #5, VS_LENGTH                       ; 5302
                                FD 8F       62   91 0004F        CMPB    (VALSPEC), #253                 ; 5303
                                            07   12 00053        BNEQ    3$                              ;
                                  54 01 A2   3C 00055        MOVZWL  1(VALSPEC), VS_LENGTH               ; 5305
                                  54    03   C0 00059        ADDL2   #3, VS_LENGTH                       ;
                                  52    54   C0 0005C 3$:    ADDL2   VS_LENGTH, VALSPEC                  ; 5307
                                  02    63   91 0005F        CMPB    (RANGESPEC), #2                     ; 5314
                                            26   12 00062        BNEQ    5$                              ;
                                        5E   DD 00064        PUSHL   SP                                  ; 5317
                                     08 AE   9F 00066        PUSHAB  VALPTR                              ;
                                        52   DD 00069        PUSHL   VALSPEC                             ;
                                FE12 CF      03   FB 0006B        CALLS   #3, DBG$STA_VALSPEC             ;
                                  55 04 AE   D0 00070        MOVL    VALPTR, VALUEPTR                    ; 5318
                                  57    65   D0 00074        MOVL    (VALUEPTR), HIGHBOUND               ; 5319
                                  54    05   D0 00077        MOVL    #5, VS_LENGTH                       ; 5320
                                FD 8F       62   91 0007A        CMPB    (VALSPEC), #253                 ; 5321
                                            07   12 0007E        BNEQ    4$                              ;
                                  54 01 A2   3C 00080        MOVZWL  1(VALSPEC), VS_LENGTH               ; 5323
                                  54    03   C0 00084        ADDL2   #3, VS_LENGTH                       ;
                                  52    54   C0 00087 4$:    ADDL2   VS_LENGTH, VALSPEC                  ; 5325
```

```
                          59      04  AC  D1 0008A 5$:     CMPL    TAGVALUE, LOWBOUND                ; 5334
                                      0A  19 0008E         BLSS    6$                                ;
                          57      04  AC  D1 00090         CMPL    TAGVALUE, HIGHBOUND               ;
                                      04  14 00094         BGTR    6$                                ;
                          50          01  D0 00096         MOVL    #1, R0                            ; 5336
                                      04 00099             RET                                       ;
                          53          52  D0 0009A 6$:     MOVL    VALSPEC, RANGESPEC                ; 5338
                       91 56          58  F2 0009D 7$:     AOBLSS  R8, I, 2$                         ; 5290
                                      50  D4 000A1         CLRL    R0                                ; 5345
                                      04 000A3             RET                                       ; 5347

; Routine Size:  164 bytes,    Routine Base:  DBG$CODE + 2316
```

```
;  5249          5348  1 GLOBAL ROUTINE DBG$TEST_ROUTINE_CALL( P1, P2, P3, P4 ) =
;  5250          5349  1 !
;  5251          5350  1 ! FUNCTION
;  5252          5351  1 !       DBG$TEST_ROUTINE_CALL is a test routine to be called from
;  5253          5352  1 !       the stack machine or DSTs, to test if the call to the routine
;  5254          5353  1 !       is correct.
;  5255          5354  1 !
;  5256          5355  1 ! INPUTS
;  5257          5356  1 !       P1 - First  parameter
;  5258          5357  1 !       P2 - Second parameter
;  5259          5358  1 !       P3 - Third  parameter
;  5260          5359  1 !       P4 - Fourth parameter
;  5261          5360  1 !
;  5262          5361  1 ! OUTPUTS
;  5263          5362  1 !       none
;  5264          5363  1 !
;  5265          5364  1 ! SIDE EFFECTS
;  5266          5365  1 !       none
;  5267          5366  1 !
;  5268          5367  2     BEGIN
;  5269          5368  2
;  5270          5369  2     RETURN P1
;  5271          5370  2
;  5272          5371  1     END;


                                0000 00000          .ENTRY  DBG$TEST_ROUTINE_CALL, Save nothing          ; 5348
                          50    04   AC  9E 00002    MOVAB   P1, R0                                       ; 5369
                                           04 00006    RET                                                  ; 5371

; Routine Size:  7 bytes,    Routine Base:  DBG$CODE + 23BA
```

```
;  5274     5372  1 GLOBAL ROUTINE DBG$TRANS_TO_REGNAME (ADDRESS, NAME) =
;  5275     5373  1 !
;  5276     5374  1 ! FUNCTIONAL DESCRIPTION:
;  5277     5375  1 !
;  5278     5376  1 !       This routine determines if the input address corresponds to an address
;  5279     5377  1 !       in the context register save area. If it does, a counted string of the
;  5280     5378  1 !       register name is returned. This string includes the scope number.
;  5281     5379  1 !
;  5282     5380  1 ! FORMAL PARAMETERS:
;  5283     5381  1 !
;  5284     5382  1 !       ADDRESS         - Address to be translated to a register name
;  5285     5383  1 !
;  5286     5384  1 !       NAME            - The address of a longword to contain the address
;  5287     5385  1 !                         of the resulting counted string.
;  5288     5386  1 !
;  5289     5387  1 ! IMPLICIT INPUTS:
;  5290     5388  1 !
;  5291     5389  1 !       DBG$REG_VALUES  - Vector of context register save areas
;  5292     5390  1 !
;  5293     5391  1 ! IMPLICIT OUTPUTS:
;  5294     5392  1 !
;  5295     5393  1 !       NONE
;  5296     5394  1 !
;  5297     5395  1 ! ROUTINE VALUE:
;  5298     5396  1 !
;  5299     5397  1 !       An unsigned integer longword completion code
;  5300     5398  1 !
;  5301     5399  1 ! COMPLETION CODES:
;  5302     5400  1 !
;  5303     5401  1 !       STS$K_SUCCESS           - Success. Input address mapped to register name.
;  5304     5402  1 !
;  5305     5403  1 !       STS$K_SEVERE            - Failure. Input address does not correspond to
;  5306     5404  1 !                                 context register save area.
;  5307     5405  1 !
;  5308     5406  1 ! SIDE EFFECTS:
;  5309     5407  1 !
;  5310     5408  1 !       NONE
;  5311     5409  1 !
;  5312     5410  1
;  5313     5411  2     BEGIN
;  5314     5412  2
;  5315     5413  2     LOCAL
;  5316     5414  2         INDEX,                                  ! Index into arrays
;  5317     5415  2         REGNAME_TABLE: VECTOR [68,LONG],        ! Register name table
;  5318     5416  2         CONTROL_DESC: BLOCK [8,BYTE],           ! $FAO control descriptor
;  5319     5417  2         FAO_LENGTH: WORD,                       ! $FAO output length
;  5320     5418  2         OUTPUT_DESC: BLOCK [8,BYTE],            ! Output descriptor for FAO
;  5321     5419  2         OUTPUT_BUFFER: REF VECTOR [,BYTE]; ! Output buffer
;  5322     5420  2
;  5323     5421  2     BIND
;  5324     5422  2         FAO_STRING      = UPLIT BYTE ('!UL!AC!AC'),  ! $FAO directive string
;  5325     5423  2         SEP_STRING      = UPLIT BYTE (%ASCIC '\%');  ! Separator string
;  5326     5424  2
;  5327     5425  2
;  5328     5426  2
;  5329     5427  2     ! Fill in the register name table. Note that this MUST be done at runtime.
;  5330     5428  2     !
```

```
;  5331          5429  2     REGNAME_TABLE [0] = UPLIT BYTE (%ASCIC 'R0');
;  5332          5430  2     REGNAME_TABLE [1] = UPLIT BYTE (%ASCIC 'R0+1');
;  5333          5431  2     REGNAME_TABLE [2] = UPLIT BYTE (%ASCIC 'R0+2');
;  5334          5432  2     REGNAME_TABLE [3] = UPLIT BYTE (%ASCIC 'R0+3');
;  5335          5433  2     REGNAME_TABLE [4] = UPLIT BYTE (%ASCIC 'R1');
;  5336          5434  2     REGNAME_TABLE [5] = UPLIT BYTE (%ASCIC 'R1+1');
;  5337          5435  2     REGNAME_TABLE [6] = UPLIT BYTE (%ASCIC 'R1+2');
;  5338          5436  2     REGNAME_TABLE [7] = UPLIT BYTE (%ASCIC 'R1+3');
;  5339          5437  2     REGNAME_TABLE [8] = UPLIT BYTE (%ASCIC 'R2');
;  5340          5438  2     REGNAME_TABLE [9] = UPLIT BYTE (%ASCIC 'R2+1');
;  5341          5439  2     REGNAME_TABLE [10] = UPLIT BYTE (%ASCIC 'R2+2');
;  5342          5440  2     REGNAME_TABLE [11] = UPLIT BYTE (%ASCIC 'R2+3');
;  5343          5441  2     REGNAME_TABLE [12] = UPLIT BYTE (%ASCIC 'R3');
;  5344          5442  2     REGNAME_TABLE [13] = UPLIT BYTE (%ASCIC 'R3+1');
;  5345          5443  2     REGNAME_TABLE [14] = UPLIT BYTE (%ASCIC 'R3+2');
;  5346          5444  2     REGNAME_TABLE [15] = UPLIT BYTE (%ASCIC 'R3+3');
;  5347          5445  2     REGNAME_TABLE [16] = UPLIT BYTE (%ASCIC 'R4');
;  5348          5446  2     REGNAME_TABLE [17] = UPLIT BYTE (%ASCIC 'R4+1');
;  5349          5447  2     REGNAME_TABLE [18] = UPLIT BYTE (%ASCIC 'R4+2');
;  5350          5448  2     REGNAME_TABLE [19] = UPLIT BYTE (%ASCIC 'R4+3');
;  5351          5449  2     REGNAME_TABLE [20] = UPLIT BYTE (%ASCIC 'R5');
;  5352          5450  2     REGNAME_TABLE [21] = UPLIT BYTE (%ASCIC 'R5+1');
;  5353          5451  2     REGNAME_TABLE [22] = UPLIT BYTE (%ASCIC 'R5+2');
;  5354          5452  2     REGNAME_TABLE [23] = UPLIT BYTE (%ASCIC 'R5+3');
;  5355          5453  2     REGNAME_TABLE [24] = UPLIT BYTE (%ASCIC 'R6');
;  5356          5454  2     REGNAME_TABLE [25] = UPLIT BYTE (%ASCIC 'R6+1');
;  5357          5455  2     REGNAME_TABLE [26] = UPLIT BYTE (%ASCIC 'R6+2');
;  5358          5456  2     REGNAME_TABLE [27] = UPLIT BYTE (%ASCIC 'R6+3');
;  5359          5457  2     REGNAME_TABLE [28] = UPLIT BYTE (%ASCIC 'R7');
;  5360          5458  2     REGNAME_TABLE [29] = UPLIT BYTE (%ASCIC 'R7+1');
;  5361          5459  2     REGNAME_TABLE [30] = UPLIT BYTE (%ASCIC 'R7+2');
;  5362          5460  2     REGNAME_TABLE [31] = UPLIT BYTE (%ASCIC 'R7+3');
;  5363          5461  2     REGNAME_TABLE [32] = UPLIT BYTE (%ASCIC 'R8');
;  5364          5462  2     REGNAME_TABLE [33] = UPLIT BYTE (%ASCIC 'R8+1');
;  5365          5463  2     REGNAME_TABLE [34] = UPLIT BYTE (%ASCIC 'R8+2');
;  5366          5464  2     REGNAME_TABLE [35] = UPLIT BYTE (%ASCIC 'R8+3');
;  5367          5465  2     REGNAME_TABLE [36] = UPLIT BYTE (%ASCIC 'R9');
;  5368          5466  2     REGNAME_TABLE [37] = UPLIT BYTE (%ASCIC 'R9+1');
;  5369          5467  2     REGNAME_TABLE [38] = UPLIT BYTE (%ASCIC 'R9+2');
;  5370          5468  2     REGNAME_TABLE [39] = UPLIT BYTE (%ASCIC 'R9+3');
;  5371          5469  2     REGNAME_TABLE [40] = UPLIT BYTE (%ASCIC 'R10');
;  5372          5470  2     REGNAME_TABLE [41] = UPLIT BYTE (%ASCIC 'R10+1');
;  5373          5471  2     REGNAME_TABLE [42] = UPLIT BYTE (%ASCIC 'R10+2');
;  5374          5472  2     REGNAME_TABLE [43] = UPLIT BYTE (%ASCIC 'R10+3');
;  5375          5473  2     REGNAME_TABLE [44] = UPLIT BYTE (%ASCIC 'R11');
;  5376          5474  2     REGNAME_TABLE [45] = UPLIT BYTE (%ASCIC 'R11+1');
;  5377          5475  2     REGNAME_TABLE [46] = UPLIT BYTE (%ASCIC 'R11+2');
;  5378          5476  2     REGNAME_TABLE [47] = UPLIT BYTE (%ASCIC 'R11+3');
;  5379          5477  2     REGNAME_TABLE [48] = UPLIT BYTE (%ASCIC 'AP');
;  5380          5478  2     REGNAME_TABLE [49] = UPLIT BYTE (%ASCIC 'AP+1');
;  5381          5479  2     REGNAME_TABLE [50] = UPLIT BYTE (%ASCIC 'AP+2');
;  5382          5480  2     REGNAME_TABLE [51] = UPLIT BYTE (%ASCIC 'AP+3');
;  5383          5481  2     REGNAME_TABLE [52] = UPLIT BYTE (%ASCIC 'FP');
;  5384          5482  2     REGNAME_TABLE [53] = UPLIT BYTE (%ASCIC 'FP+1');
;  5385          5483  2     REGNAME_TABLE [54] = UPLIT BYTE (%ASCIC 'FP+2');
;  5386          5484  2     REGNAME_TABLE [55] = UPLIT BYTE (%ASCIC 'FP+3');
;  5387          5485  2     REGNAME_TABLE [56] = UPLIT BYTE (%ASCIC 'SP');
```

```
;  5388          5486  2     REGNAME_TABLE [57] = UPLIT BYTE (%ASCIC 'SP+1');
;  5389          5487  2     REGNAME_TABLE [58] = UPLIT BYTE (%ASCIC 'SP+2');
;  5390          5488  2     REGNAME_TABLE [59] = UPLIT BYTE (%ASCIC 'SP+3');
;  5391          5489  2     REGNAME_TABLE [60] = UPLIT BYTE (%ASCIC 'PC');
;  5392          5490  2     REGNAME_TABLE [61] = UPLIT BYTE (%ASCIC 'PC+1');
;  5393          5491  2     REGNAME_TABLE [62] = UPLIT BYTE (%ASCIC 'PC+2');
;  5394          5492  2     REGNAME_TABLE [63] = UPLIT BYTE (%ASCIC 'PC+3');
;  5395          5493  2     REGNAME_TABLE [64] = UPLIT BYTE (%ASCIC 'PSL');
;  5396          5494  2     REGNAME_TABLE [65] = UPLIT BYTE (%ASCIC 'PSL+1');
;  5397          5495  2     REGNAME_TABLE [66] = UPLIT BYTE (%ASCIC 'PSL+2');
;  5398          5496  2     REGNAME_TABLE [67] = UPLIT BYTE (%ASCIC 'PSL+3');
;  5399          5497  2
;  5400          5498  2
;  5401          5499  2     ! Check to see if the input address falls in the context register area.
;  5402          5500  2     ! If so, we format the scope number and register name in a buffer which
;  5403          5501  2     ! we then return to the caller.  We return with the status STS$K_SUCCESS.
;  5404          5502  2     !
;  5405          5503  2     IF (.ADDRESS GEQA DBG$REG_VALUES [0]) AND
;  5406          5504  3        (.ADDRESS LSSA DBG$REG_VALUES [17])
;  5407          5505  2     THEN
;  5408          5506  3         BEGIN
;  5409          5507  3
;  5410          5508  3
;  5411          5509  3         ! Calculate the register index and get a temporary memory buffer for
;  5412          5510  3         ! ASCII register name.
;  5413          5511  3         !
;  5414          5512  3         INDEX = .ADDRESS - DBG$REG_VALUES [0];
;  5415          5513  3         OUTPUT_BUFFER = DBG$GET_TEMPMEM(10);
;  5416          5514  3
;  5417          5515  3
;  5418          5516  3         ! Set up the FAO call
;  5419          5517  3         !
;  5420          5518  3         CONTROL_DESC [DSC$W_LENGTH] = %CHARCOUNT ('!UL!AC!AC');
;  5421          5519  3         CONTROL_DESC [DSC$A_POINTER] = FAO_STRING;
;  5422          5520  3         OUTPUT_DESC [DSC$W_LENGTH] = (10 * %UPVAL) - 1;
;  5423          5521  3         OUTPUT_DESC [DSC$A_POINTER] = OUTPUT_BUFFER [1];
;  5424          5522  3
;  5425          5523  3
;  5426          5524  3         ! Format the scope number, the separator, and the register name.
;  5427          5525  3         !
;  5428          5526  3         IF NOT SYS$FAO (CONTROL_DESC,
;  5429          5527  3                         FAO_LENGTH,
;  5430          5528  3                         OUTPUT_DESC,
;  5431          5529  3                         .DBG$REG_SCOPE,
;  5432          5530  3                         SEP_STRING,
;  5433          5531  3                         .REGNAME_TABLE [.INDEX])
;  5434          5532  3         THEN
;  5435          5533  3             $DBG_ERROR('RSTACCESS\TRANS_TO_REGNAME');
;  5436          5534  3
;  5437          5535  3
;  5438          5536  3         ! Copy the count into the first byte of the output buffer and return.
;  5439          5537  3         !
;  5440          5538  3         OUTPUT_BUFFER [0] = .FAO_LENGTH;
;  5441          5539  3         .NAME = .OUTPUT_BUFFER;
;  5442          5540  3         RETURN STS$K_SUCCESS;
;  5443          5541  3
;  5444          5542  3         END
```

```
;  5445          5543  3
;  5446          5544
;  5447          5545          ! The input address does not fall in the register save area.  Hence we
;  5448          5546          ! return the status STS$K_SEVERE to indicate this.
;  5449          5547          !
;  5450          5548  2       ELSE
;  5451          5549  2           RETURN STS$K_SEVERE;
;  5452          5550  2
;  5453          5551  1       END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                    43  41  21  43  41  21  4C  55  21  00283 P.ABI:   .ASCII  \!UL!AC!AC\                    ;
                                        25  5C  02  0028C P.ABJ:   .ASCII  <2><92>\%\                      ;
                                        30  52  02  0028F P.ABK:   .ASCII  <2>\R0\                         ;
                                    31  2B  30  52  04  00292 P.ABL:   .ASCII  <4>\R0+1\                    ;
                                    32  2B  30  52  04  00297 P.ABM:   .ASCII  <4>\R0+2\                    ;
                                    33  2B  30  52  04  0029C P.ABN:   .ASCII  <4>\R0+3\                    ;
                                        31  52  02  002A1 P.ABO:   .ASCII  <2>\R1\                         ;
                                    31  2B  31  52  04  002A4 P.ABP:   .ASCII  <4>\R1+1\                    ;
                                    32  2B  31  52  04  002A9 P.ABQ:   .ASCII  <4>\R1+2\                    ;
                                    33  2B  31  52  04  002AE P.ABR:   .ASCII  <4>\R1+3\                    ;
                                        32  52  02  002B3 P.ABS:   .ASCII  <2>\R2\                         ;
                                    31  2B  32  52  04  002B6 P.ABT:   .ASCII  <4>\R2+1\                    ;
                                    32  2B  32  52  04  002BB P.ABU:   .ASCII  <4>\R2+2\                    ;
                                    33  2B  32  52  04  002C0 P.ABV:   .ASCII  <4>\R2+3\                    ;
                                        33  52  02  002C5 P.ABW:   .ASCII  <2>\R3\                         ;
                                    31  2B  33  52  04  002C8 P.ABX:   .ASCII  <4>\R3+1\                    ;
                                    32  2B  33  52  04  002CD P.ABY:   .ASCII  <4>\R3+2\                    ;
                                    33  2B  33  52  04  002D2 P.ABZ:   .ASCII  <4>\R3+3\                    ;
                                        34  52  02  002D7 P.ACA:   .ASCII  <2>\R4\                         ;
                                    31  2B  34  52  04  002DA P.ACB:   .ASCII  <4>\R4+1\                    ;
                                    32  2B  34  52  04  002DF P.ACC:   .ASCII  <4>\R4+2\                    ;
                                    33  2B  34  52  04  002E4 P.ACD:   .ASCII  <4>\R4+3\                    ;
                                        35  52  02  002E9 P.ACE:   .ASCII  <2>\R5\                         ;
                                    31  2B  35  52  04  002EC P.ACF:   .ASCII  <4>\R5+1\                    ;
                                    32  2B  35  52  04  002F1 P.ACG:   .ASCII  <4>\R5+2\                    ;
                                    33  2B  35  52  04  002F6 P.ACH:   .ASCII  <4>\R5+3\                    ;
                                        36  52  02  002FB P.ACI:   .ASCII  <2>\R6\                         ;
                                    31  2B  36  52  04  002FE P.ACJ:   .ASCII  <4>\R6+1\                    ;
                                    32  2B  36  52  04  00303 P.ACK:   .ASCII  <4>\R6+2\                    ;
                                    33  2B  36  52  04  00308 P.ACL:   .ASCII  <4>\R6+3\                    ;
                                        37  52  02  0030D P.ACM:   .ASCII  <2>\R7\                         ;
                                    31  2B  37  52  04  00310 P.ACN:   .ASCII  <4>\R7+1\                    ;
                                    32  2B  37  52  04  00315 P.ACO:   .ASCII  <4>\R7+2\                    ;
                                    33  2B  37  52  04  0031A P.ACP:   .ASCII  <4>\R7+3\                    ;
                                        38  52  02  0031F P.ACQ:   .ASCII  <2>\R8\                         ;
                                    31  2B  38  52  04  00322 P.ACR:   .ASCII  <4>\R8+1\                    ;
                                    32  2B  38  52  04  00327 P.ACS:   .ASCII  <4>\R8+2\                    ;
                                    33  2B  38  52  04  0032C P.ACT:   .ASCII  <4>\R8+3\                    ;
                                        39  52  02  00331 P.ACU:   .ASCII  <2>\R9\                         ;
                                    31  2B  39  52  04  00334 P.ACV:   .ASCII  <4>\R9+1\                    ;
                                    32  2B  39  52  04  00339 P.ACW:   .ASCII  <4>\R9+2\                    ;
                                    33  2B  39  52  04  0033E P.ACX:   .ASCII  <4>\R9+3\                    ;
                                        30  31  52  03  00343 P.ACY:   .ASCII  <3>\R10\                     ;
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                                                31 2B 30 31 52 05 00347 P.ACZ:   .ASCII  <5>\R10+1\                                    ;
                                                32 2B 30 31 52 05 0034D P.ADA:   .ASCII  <5>\R10+2\                                    ;
                                                33 2B 30 31 52 05 00353 P.ADB:   .ASCII  <5>\R10+3\                                    ;
                                                   31 31 52 03 00359 P.ADC:   .ASCII  <3>\R11\                                         ;
                                                31 2B 31 31 52 05 0035D P.ADD:   .ASCII  <5>\R11+1\                                    ;
                                                32 2B 31 31 52 05 00363 P.ADE:   .ASCII  <5>\R11+2\                                    ;
                                                33 2B 31 31 52 05 00369 P.ADF:   .ASCII  <5>\R11+3\                                    ;
                                                   50 41 02 0036F P.ADG:   .ASCII  <2>\AP\                                             ;
                                                   31 2B 50 41 04 00372 P.ADH:   .ASCII  <4>\AP+1\                                     ;
                                                   32 2B 50 41 04 00377 P.ADI:   .ASCII  <4>\AP+2\                                     ;
                                                   33 2B 50 41 04 0037C P.ADJ:   .ASCII  <4>\AP+3\                                     ;
                                                   50 46 02 00381 P.ADK:   .ASCII  <2>\FP\                                             ;
                                                   31 2B 50 46 04 00384 P.ADL:   .ASCII  <4>\FP+1\                                     ;
                                                   32 2B 50 46 04 00389 P.ADM:   .ASCII  <4>\FP+2\                                     ;
                                                   33 2B 50 46 04 0038E P.ADN:   .ASCII  <4>\FP+3\                                     ;
                                                   50 53 02 00393 P.ADO:   .ASCII  <2>\SP\                                             ;
                                                   31 2B 50 53 04 00396 P.ADP:   .ASCII  <4>\SP+1\                                     ;
                                                   32 2B 50 53 04 0039B P.ADQ:   .ASCII  <4>\SP+2\                                     ;
                                                   33 2B 50 53 04 003A0 P.ADR:   .ASCII  <4>\SP+3\                                     ;
                                                   43 50 02 003A5 P.ADS:   .ASCII  <2>\PC\                                             ;
                                                   31 2B 43 50 04 003A8 P.ADT:   .ASCII  <4>\PC+1\                                     ;
                                                   32 2B 43 50 04 003AD P.ADU:   .ASCII  <4>\PC+2\                                     ;
                                                   33 2B 43 50 04 003B2 P.ADV:   .ASCII  <4>\PC+3\                                     ;
                                                   4C 53 50 03 003B7 P.ADW:   .ASCII  <3>\PSL\                                         ;
                                                31 2B 4C 53 50 05 003BB P.ADX:   .ASCII  <5>\PSL+1\                                    ;
                                                32 2B 4C 53 50 05 003C1 P.ADY:   .ASCII  <5>\PSL+2\                                    ;
                                                33 2B 4C 53 50 05 003C7 P.ADZ:   .ASCII  <5>\PSL+3\                                    ;
4E 41 52 54 5C 53 53 45 43 43 41 54 53 52 1A 003CD P.AEA:   .ASCII  <26>\RSTACCESS\<92>\TRANS_TO_REGNAME\                              ;
   45 4D 41 4E 47 45 52 5F 4F 54 5F 53 003DC                                                                                           ;

                                                                  FAO_STRING=          P.ABI
                                                                  SEP_STRING=          P.ABJ

                                                                  .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                003C 00000        .ENTRY  DBG$TRANS_TO_REGNAME, Save R2,R3,R4,R5                      ; 5372
                                             55 00000000G   00 9E 00002 MOVAB   DBG$REG_VALUES, R5                                      ;
                                             54 00000000'   EF 9E 00009 MOVAB   P.ABK, R4                                               ;
                                             5E     FEDC    CE 9E 00010 MOVAB   -292(SP), SP                                           ;
                                          14 AE              64 9E 00015 MOVAB   P.ABK, REGNAME_TABLE                                   ; 5429
                                          18 AE           03 A4 9E 00019 MOVAB   P.ABL, REGNAME_TABLE+4                                 ; 5430
                                          1C AE           08 A4 9E 0001E MOVAB   P.ABM, REGNAME_TABLE+8                                 ; 5431
                                          20 AE           0D A4 9E 00023 MOVAB   P.ABN, REGNAME_TABLE+12                                ; 5432
                                          24 AE           12 A4 9E 00028 MOVAB   P.ABO, REGNAME_TABLE+16                                ; 5433
                                          28 AE           15 A4 9E 0002D MOVAB   P.ABP, REGNAME_TABLE+20                                ; 5434
                                          2C AE           1A A4 9E 00032 MOVAB   P.ABQ, REGNAME_TABLE+24                                ; 5435
                                          30 AE           1F A4 9E 00037 MOVAB   P.ABR, REGNAME_TABLE+28                                ; 5436
                                          34 AE           24 A4 9E 0003C MOVAB   P.ABS, REGNAME_TABLE+32                                ; 5437
                                          38 AE           27 A4 9E 00041 MOVAB   P.ABT, REGNAME_TABLE+36                                ; 5438
                                          3C AE           2C A4 9E 00046 MOVAB   P.ABU, REGNAME_TABLE+40                                ; 5439
                                          40 AE           31 A4 9E 0004B MOVAB   P.ABV, REGNAME_TABLE+44                                ; 5440
                                          44 AE           36 A4 9E 00050 MOVAB   P.ABW, REGNAME_TABLE+48                                ; 5441
                                          48 AE           39 A4 9E 00055 MOVAB   P.ABX, REGNAME_TABLE+52                                ; 5442
                                          4C AE           3E A4 9E 0005A MOVAB   P.ABY, REGNAME_TABLE+56                                ; 5443
                                          50 AE           43 A4 9E 0005F MOVAB   P.ABZ, REGNAME_TABLE+60                                ; 5444
                                          54 AE           48 A4 9E 00064 MOVAB   P.ACA, REGNAME_TABLE+64                                ; 5445
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                58   AE      4B   A4   9E 00069         MOVAB   P.ACB, REGNAME_TABLE+68                 ;  5446
                5C   AE      50   A4   9E 0006E         MOVAB   P.ACC, REGNAME_TABLE+72                 ;  5447
                60   AE      55   A4   9E 00073         MOVAB   P.ACD, REGNAME_TABLE+76                 ;  5448
                64   AE      5A   A4   9E 00078         MOVAB   P.ACE, REGNAME_TABLE+80                 ;  5449
                68   AE      5D   A4   9E 0007D         MOVAB   P.ACF, REGNAME_TABLE+84                 ;  5450
                6C   AE      62   A4   9E 00082         MOVAB   P.ACG, REGNAME_TABLE+88                 ;  5451
                70   AE      67   A4   9E 00087         MOVAB   P.ACH, REGNAME_TABLE+92                 ;  5452
                74   AE      6C   A4   9E 0008C         MOVAB   P.ACI, REGNAME_TABLE+96                 ;  5453
                78   AE      6F   A4   9E 00091         MOVAB   P.ACJ, REGNAME_TABLE+100                ;  5454
                7C   AE      74   A4   9E 00096         MOVAB   P.ACK, REGNAME_TABLE+104                ;  5455
              0080   CE      79   A4   9E 0009B         MOVAB   P.ACL, REGNAME_TABLE+108                ;  5456
              0084   CE      7E   A4   9E 000A1         MOVAB   P.ACM, REGNAME_TABLE+112                ;  5457
              0088   CE    0081   C4   9E 000A7         MOVAB   P.ACN, REGNAME_TABLE+116                ;  5458
              008C   CE    0086   C4   9E 000AE         MOVAB   P.ACO, REGNAME_TABLE+120                ;  5459
              0090   CE    008B   C4   9E 000B5         MOVAB   P.ACP, REGNAME_TABLE+124                ;  5460
              FF70   CD    0090   C4   9E 000BC         MOVAB   P.ACQ, REGNAME_TABLE+128                ;  5461
              FF74   CD    0093   C4   9E 000C3         MOVAB   P.ACR, REGNAME_TABLE+132                ;  5462
              FF78   CD    0098   C4   9E 000CA         MOVAB   P.ACS, REGNAME_TABLE+136                ;  5463
              FF7C   CD    009D   C4   9E 000D1         MOVAB   P.ACT, REGNAME_TABLE+140                ;  5464
                80   AD    00A2   C4   9E 000D8         MOVAB   P.ACU, REGNAME_TABLE+144                ;  5465
                84   AD    00A5   C4   9E 000DE         MOVAB   P.ACV, REGNAME_TABLE+148                ;  5466
                88   AD    00AA   C4   9E 000E4         MOVAB   P.ACW, REGNAME_TABLE+152                ;  5467
                8C   AD    00AF   C4   9E 000EA         MOVAB   P.ACX, REGNAME_TABLE+156                ;  5468
                90   AD    00B4   C4   9E 000F0         MOVAB   P.ACY, REGNAME_TABLE+160                ;  5469
                94   AD    00B8   C4   9E 000F6         MOVAB   P.ACZ, REGNAME_TABLE+164                ;  5470
                98   AD    00BE   C4   9E 000FC         MOVAB   P.ADA, REGNAME_TABLE+168                ;  5471
                9C   AD    00C4   C4   9E 00102         MOVAB   P.ADB, REGNAME_TABLE+172                ;  5472
                A0   AD    00CA   C4   9E 00108         MOVAB   P.ADC, REGNAME_TABLE+176                ;  5473
                A4   AD    00CE   C4   9E 0010E         MOVAB   P.ADD, REGNAME_TABLE+180                ;  5474
                A8   AD    00D4   C4   9E 00114         MOVAB   P.ADE, REGNAME_TABLE+184                ;  5475
                AC   AD    00DA   C4   9E 0011A         MOVAB   P.ADF, REGNAME_TABLE+188                ;  5476
                B0   AD    00E0   C4   9E 00120         MOVAB   P.ADG, REGNAME_TABLE+192                ;  5477
                B4   AD    00E3   C4   9E 00126         MOVAB   P.ADH, REGNAME_TABLE+196                ;  5478
                B8   AD    00E8   C4   9E 0012C         MOVAB   P.ADI, REGNAME_TABLE+200                ;  5479
                BC   AD    00ED   C4   9E 00132         MOVAB   P.ADJ, REGNAME_TABLE+204                ;  5480
                C0   AD    00F2   C4   9E 00138         MOVAB   P.ADK, REGNAME_TABLE+208                ;  5481
                C4   AD    00F5   C4   9E 0013E         MOVAB   P.ADL, REGNAME_TABLE+212                ;  5482
                C8   AD    00FA   C4   9E 00144         MOVAB   P.ADM, REGNAME_TABLE+216                ;  5483
                CC   AD    00FF   C4   9E 0014A         MOVAB   P.ADN, REGNAME_TABLE+220                ;  5484
                D0   AD    0104   C4   9E 00150         MOVAB   P.ADO, REGNAME_TABLE+224                ;  5485
                D4   AD    0107   C4   9E 00156         MOVAB   P.ADP, REGNAME_TABLE+228                ;  5486
                D8   AD    010C   C4   9E 0015C         MOVAB   P.ADQ, REGNAME_TABLE+232                ;  5487
                DC   AD    0111   C4   9E 00162         MOVAB   P.ADR, REGNAME_TABLE+236                ;  5488
                E0   AD    0116   C4   9E 00168         MOVAB   P.ADS, REGNAME_TABLE+240                ;  5489
                E4   AD    0119   C4   9E 0016E         MOVAB   P.ADT, REGNAME_TABLE+244                ;  5490
                E8   AD    011E   C4   9E 00174         MOVAB   P.ADU, REGNAME_TABLE+248                ;  5491
                EC   AD    0123   C4   9E 0017A         MOVAB   P.ADV, REGNAME_TABLE+252                ;  5492
                F0   AD    0128   C4   9E 00180         MOVAB   P.ADW, REGNAME_TABLE+256                ;  5493
                F4   AD    012C   C4   9E 00186         MOVAB   P.ADX, REGNAME_TABLE+260                ;  5494
                F8   AD    0132   C4   9E 0018C         MOVAB   P.ADY, REGNAME_TABLE+264                ;  5495
                FC   AD    0138   C4   9E 00192         MOVAB   P.ADZ, REGNAME_TABLE+268                ;  5496
                          50        65   9E 00198         MOVAB   DBG$REG_VALUES, R0                      ;  5503
                          50     04   AC   D1 0019B         CMPL    ADDRESS, R0
                                      6E   1F 0019F         BLSSU   2$
                          50     44   A5   9E 001A1         MOVAB   DBG$REG_VALUES+68, R0                   ;  5504
                          50     04   AC   D1 001A5         CMPL    ADDRESS, R0
                                      64   1E 001A9         BGEQU   2$                                      ;
```

```
                    50              65  9E 001AB        MOVAB   DBG$REG_VALUES, R0                      ; 5512
                52  04   AC         50  C3 001AE        SUBL3   R0, ADDRESS, INDEX                      ;
                                     0A  DD 001B3        PUSHL   #10                                     ; 5513
                    00000000G   00   01  FB 001B5        CALLS   #1, DBG$GET_TEMPMEM                     ;
                    53              50  D0 001BC        MOVL    R0, OUTPUT_BUFFER                       ;
                    0C   AE         09  B0 001BF        MOVW    #9, CONTROL_DESC                        ; 5518
                    10   AE     F4   A4  9E 001C3        MOVAB   FAO_STRING, CONTROL_DESC+4              ; 5519
                    04   AE         27  B0 001C8        MOVW    #39, OUTPUT_DESC                        ; 5520
                    08   AE     01   A3  9E 001CC        MOVAB   1(R3), OUTPUT_DESC+4                    ; 5521
                         14 AE42     DD  001D1           PUSHL   REGNAME_TABLE[INDEX]                    ; 5531
                         FD   A4     9F  001D5           PUSHAB  SEP_STRING                              ; 5526
                    00000000'   EF   DD  001D8           PUSHL   DBG$REG_SCOPE                           ; 5529
                         10   AE     9F  001DE           PUSHAB  OUTPUT_DESC                             ; 5526
                         10   AE     9F  001E1           PUSHAB  FAO_LENGTH                              ;
                         20   AE     9F  001E4           PUSHAB  CONTROL_DESC                            ;
                    00000000G   9F       06  FB 001E7   CALLS   #6, @#SYS$FAO                          ;
                                13       50  E8 001EE   BLBS    R0, 1$                                  ;
                              013E   C4   9F  001F1      PUSHAB  P.AEA                                   ; 5533
                                     01   DD  001F5      PUSHL   #1                                      ;
                          00028362   8F   DD  001F7      PUSHL   #164706                                 ;
                    00000000G   00       03  FB 001FD   CALLS   #3, LIB$SIGNAL                         ;
                                63       6E  90 00204 1$: MOVB    FAO_LENGTH, (OUTPUT_BUFFER)             ; 5538
                         08   BC         53  D0 00207    MOVL    OUTPUT_BUFFER, @NAME                    ; 5539
                                50       01  D0 0020B    MOVL    #1, R0                                  ; 5549
                                             04 0020E    RET                                             ;
                                50       04  D0 0020F 2$: MOVL    #4, R0                                  ;
                                             04 00212    RET                                             ; 5551

; Routine Size:  531 bytes,    Routine Base:  DBG$CODE + 23C1

; 5454          5552  1
```

```
;  5456          5553  1 ROUTINE ADD_TO_REF_COUNT(RSTPTR, INCREMENT): NOVALUE =
;  5457          5554  1 !
;  5458          5555  1 ! FUNCTION
;  5459          5556  1 !       This routine increments or decrements the reference count field of a
;  5460          5557  1 !       specified RST entry and all entries reachable from that entry.  An RST
;  5461          5558  1 !       is "reachable" from a specified entry if it is up-scope from that entry,
;  5462          5559  1 !       if it is referenced by the RST$L_TYPEPTR field, or it is a record com-
;  5463          5560  1 !       ponent or enumeration type element of the specified Type RST Entry.
;  5464          5561  1 !
;  5465          5562  1 ! INPUTS
;  5466          5563  1 !       RSTPTR  - A pointer to the RST entry whose reference count is to be
;  5467          5564  1 !                 incremented or decremented.
;  5468          5565  1 !
;  5469          5566  1 !       INCREMENT - The value to be added to the RST entry's reference count.
;  5470          5567  1 !                 Thus +1 increments the count and -1 decrements it.
;  5471          5568  1 !
;  5472          5569  1 ! OUTPUTS
;  5473          5570  1 !       NONE
;  5474          5571  1 !
;  5475          5572  1
;  5476          5573  2     BEGIN
;  5477          5574  2
;  5478          5575  2     MAP
;  5479          5576  2         RSTPTR: REF RST$ENTRY;          ! Pointer to the input RST entry
;  5480          5577  2
;  5481          5578  2     LOCAL
;  5482          5579  2         COMPLST: REF VECTOR[,LONG],     ! Pointer to Type or Variant Entry
;  5483          5580  2                                         !      component list
;  5484          5581  2         INVOCPTR: REF RST$ENTRY,        ! Pointer to invocation number RST entry
;  5485          5582  2         VARPTR: REF RST$VAR_ENTRY,      ! Pointer to a Variant Entry pointed to
;  5486          5583  2                                         !      by a Variant-Set RST Entry
;  5487          5584  2         VARSETTBL: REF VECTOR[,LONG];   ! Pointer to list of variants in a
;  5488          5585  2                                         !      Variant-Set RST Entry
;  5489          5586  2
;  5490          5587  2
;  5491          5588  2
;  5492          5589  2     ! Determine what kind of RST entry this is and act accordingly.
;  5493          5590  2     !
;  5494          5591  2     CASE .RSTPTR[RST$B_KIND] FROM RST$K_KIND_MINIMUM TO RST$K_KIND_MAXIMUM OF
;  5495          5592  2         SET
;  5496          5593  2
;  5497          5594  2
;  5498          5595  2         ! Handle the Module RST Entry.  We increment the reference count in
;  5499          5596  2         ! case this is a "numbered scope" Module RST Entry--such entries are
;  5500          5597  2         ! created for register symbols and are on the Temporary RST Entry List.
;  5501          5598  2         ! Since a Module RST Entry terminates every up-scope chain, we return
;  5502          5599  2         ! here.  This stops any up-scope recursion.
;  5503          5600  2         !
;  5504          5601  2         [RST$K_MODULE]:
;  5505          5602  3             BEGIN
;  5506          5603  3             RSTPTR[RST$W_REFCOUNT] = .RSTPTR[RST$W_REFCOUNT] + .INCREMENT;
;  5507          5604  3             RETURN;
;  5508          5605  2             END;
;  5509          5606  2
;  5510          5607  2
;  5511          5608  2         ! Handle all lexical entity and instruction label RST entries.  Incre-
;  5512          5609  2         ! ment the RST entry's reference count and call ADD_TO_REF_COUNT recur-
```

```
;  5513     5610  2          ! sively to increment reference counts in the whole up-scope chain.
;  5514     5611  2          !
;  5515     5612  2          [RST$K_ROUTINE, RST$K_BLOCK,
;  5516     5613  2           RST$K_ENTRY, RST$K_LABEL,
;  5517     5614  2           RST$K_LINE, RST$K_OVERLOAD]:
;  5518     5615  3              BEGIN
;  5519     5616  3              RSTPTR[RST$W_REFCOUNT] = .RSTPTR[RST$W_REFCOUNT] + .INCREMENT;
;  5520     5617  3              ADD_TO_REF_COUNT(.RSTPTR[RST$L_UPSCOPEPTR], .INCREMENT);
;  5521     5618  3              END;
;  5522     5619  2
;  5523     5620  2
;  5524     5621  2          ! Handle the Data and Type Component RST Entries.  Increment the refer-
;  5525     5622  2          ! ence count and call this routine recursively for the up-scope pointer
;  5526     5623  2          ! and the type pointer (if non-zero).
;  5527     5624  2          !
;  5528     5625  2          [RST$K_DATA, RST$K_TYPCOMP]:
;  5529     5626  3              BEGIN
;  5530     5627  3              RSTPTR[RST$W_REFCOUNT] = .RSTPTR[RST$W_REFCOUNT] + .INCREMENT;
;  5531     5628  3              ADD_TO_REF_COUNT(.RSTPTR[RST$L_UPSCOPEPTR], .INCREMENT);
;  5532     5629  3              IF .RSTPTR[RST$L_TYPEPTR] NEQ 0
;  5533     5630  3              THEN
;  5534     5631  3                  ADD_TO_REF_COUNT(.RSTPTR[RST$L_TYPEPTR], .INCREMENT);
;  5535     5632  3
;  5536     5633  3              END;
;  5537     5634  2
;  5538     5635  2
;  5539     5636  2          ! Handle the Data Type RST Entry.  Increment its reference count.  Then
;  5540     5637  2          ! call ADD_TO_REF_COUNT recursively to increment the reference counts of
;  5541     5638  2          ! the up-scope chain and all record components or enumeration elements.
;  5542     5639  2          ! Note that we use a mark bit to stop infinite recursion which would
;  5543     5640  2          ! otherwise occur for enumeration types and possibly in other cases.
;  5544     5641  2          !
;  5545     5642  2          [RST$K_TYPE]:
;  5546     5643  3              BEGIN
;  5547     5644  3              IF .RSTPTR[RST$V_MARKBIT] THEN RETURN;
;  5548     5645  3              RSTPTR[RST$V_MARKBIT] = TRUE;
;  5549     5646  3              RSTPTR[RST$W_REFCOUNT] = .RSTPTR[RST$W_REFCOUNT] + .INCREMENT;
;  5550     5647  3              ADD_TO_REF_COUNT(.RSTPTR[RST$L_UPSCOPEPTR], .INCREMENT);
;  5551     5648  3              COMPLST = RSTPTR[RST$A_TYPCOMP[ST];
;  5552     5649  3              INCR I FROM 1 TO .RSTPTR[RST$L_TYPCOMPCNT] DO
;  5553     5650  3                  ADD_TO_REF_COUNT(.COMPLST[.I - 1], .INCREMENT);
;  5554     5651  3
;  5555     5652  3              RSTPTR[RST$V_MARKBIT] = FALSE;
;  5556     5653  3              END;
;  5557     5654  2
;  5558     5655  2
;  5559     5656  2          ! Handle the Variant-Set RST Entry.  Here we call ADD_TO_REF_COUNT re-
;  5560     5657  2          ! cursively to cover all record components of the parent type.
;  5561     5658  2          !
;  5562     5659  2          [RST$K_VARIANT]:
;  5563     5660  3              BEGIN
;  5564     5661  3              ADD_TO_REF_COUNT(.RSTPTR[RST$L_VARTAGPTR], .INCREMENT);
;  5565     5662  3              VARSETTBL = RSTPTR[RST$A_VARSETTBL];
;  5566     5663  3              INCR I FROM 1 TO .RSTPTR[RST$L_VARSETCNT] DO
;  5567     5664  4                  BEGIN
;  5568     5665  4                  VARPTR = .VARSETTBL[.I - 1];
;  5569     5666  4                  COMPLST = VARPTR[RST$A_VAR_COMPLST];
```

```
;  5570          5667  4                 INCR J FROM 1 TO .VARPTR[RST$L_VAR_COMPCNT] DO
;  5571          5668  4                     ADD_TO_REF_COUNT(.COMPLST[.J - 1], .INCREMENT);
;  5572          5669  4
;  5573          5670  3                 END;
;  5574          5671  3
;  5575          5672  2             END;
;  5576          5673  2
;  5577          5674  2
;  5578          5675  2             ! Any other kind should never show up here.  If it does, error out.
;  5579          5676  2             !
;  5580          5677  2             [INRANGE, OUTRANGE]:
;  5581          5678  2                 $DBG_ERROR('RSTACCESS\ADD_TO_REF_COUNT 10');
;  5582          5679  2
;  5583          5680  2             TES;
;  5584          5681  2
;  5585          5682  2
;  5586          5683  2         ! If there is an Invocation Number RST Entry following this one on the Sym-
;  5587          5684  2         ! bol chain, increment its reference count also.
;  5588          5685  2         !
;  5589          5686  2         IF .RSTPTR[RST$V_INVOCNUM]
;  5590          5687  2         THEN
;  5591          5688  3             BEGIN
;  5592          5689  3             INVOCPTR = .RSTPTR[RST$L_SYMCHNPTR];
;  5593          5690  3             IF .INVOCPTR[RST$B_KIND] NEQ RST$K_INVOCNUM
;  5594          5691  3             THEN
;  5595          5692  3                 $DBG_ERROR('RSTACCESS\ADD_TO_REF_COUNT 20');
;  5596          5693  3
;  5597          5694  3             INVOCPTR[RST$W_REFCOUNT] = .INVOCPTR[RST$W_REFCOUNT] + .INCREMENT;
;  5598          5695  2             END;
;  5599          5696  2
;  5600          5697  2
;  5601          5698  2         ! We are all done--return.
;  5602          5699  2         !
;  5603          5700  2         RETURN;
;  5604          5701  2
;  5605          5702  1         END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

5F 44 44 41 5C 53 53 45 43 43 41 54 53 52 1D  003E8 P.AEB:    .ASCII  <29>\RSTACCESS\<92>\ADD_TO_REF_COUNT 1\      ;
   31 20 54 4E 55 4F 43 5F 46 45 52 5F 4F 54  003F7
                                              30  00405      .ASCII  \0\                                          ;
5F 44 44 41 5C 53 53 45 43 43 41 54 53 52 1D  00406 P.AEC:    .ASCII  <29>\RSTACCESS\<92>\ADD_TO_REF_COUNT 2\      ;
   32 20 54 4E 55 4F 43 5F 46 45 52 5F 4F 54  00415
                                              30  00423      .ASCII  \0\                                          ;


                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                           07FC 00000 ADD_TO_REF_COUNT:
                                                                .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10            ; 5553
                                5A 00000000G   00  9E 00002     MOVAB   LIB$SIGNAL, R10                             ;
                                59         F4  AF  9E 00009     MOVAB   ADD_TO_REF_COUNT, R9                         ;
                                56         04  AC  D0 0000D     MOVL    RSTPTR, R6                                  ; 5591
```

```
                        58        14    A6  9E 00011          MOVAB   20(R6), R8                                ;
                        00              68  8F 00015          CASEB   (R8), #0, #13                           ;
                0035    0035      002F      001C  00019 1$:    .WORD   2$-1$,-                                 ;
                0060    0042      0035      0035  00021                3$-1$,-                                 ;
                0094    0042      001C      0035  00029                4$-1$,-                                 ;
                                  0035      001C  00031                4$-1$,-                                 ;
                                                                       4$-1$,-                                 ;
                                                                       4$-1$,-                                 ;
                                                                       5$-1$,-                                 ;
                                                                       7$-1$,-                                 ;
                                                                       4$-1$,-                                 ;
                                                                       2$-1$,-                                 ;
                                                                       5$-1$,-                                 ;
                                                                       12$-1$,-                                ;
                                                                       2$-1$,-                                 ;
                                                                       4$-1$                                   ;
                          00000000'  EF  9F 00035 2$:    PUSHAB  P.AEB                                       ; 5678
                                     01  DD 0003B         PUSHL   #1                                          ;
                          00028362   8F  DD 0003D         PUSHL   #164706                                     ;
                        6A           03  FB 00043         CALLS   #3, LIB$SIGNAL                              ;
                                     63  11 00046         BRB     11$                                         ;
                02  A8        08    AC  A0 00048 3$:    ADDW2   INCREMENT, 2(R8)                            ; 5603
                                     04  0004D           RET                                                 ; 5602
                02  A8        08    AC  A0 0004E 4$:    ADDW2   INCREMENT, 2(R8)                            ; 5616
                           08    AC  DD 00053           PUSHL   INCREMENT                                   ; 5617
                           10    A6  DD 00056           PUSHL   16(R6)                                      ;
                                     19  11 00059         BRB     6$                                          ;
                02  A8        08    AC  A0 0005B 5$:    ADDW2   INCREMENT, 2(R8)                            ; 5627
                           08    AC  DD 00060           PUSHL   INCREMENT                                   ; 5628
                           10    A6  DD 00063           PUSHL   16(R6)                                      ;
                        69           02  FB 00066         CALLS   #2, ADD_TO_REF_COUNT                        ;
                           18    A6  D5 00069           TSTL    24(R6)                                      ; 5629
                                     71  13 0006C         BEQL    17$                                         ;
                           08    AC  DD 0006E           PUSHL   INCREMENT                                   ; 5631
                           18    A6  DD 00071           PUSHL   24(R6)                                      ;
                        69           02  FB 00074 6$:    CALLS   #2, ADD_TO_REF_COUNT                        ;
                                     66  11 00077         BRB     17$                                         ; 5591
            01          68           0C  E1 00079 7$:    BBC     #12, (R8), 8$                               ; 5644
                                     04  0007D           RET                                                 ;
                01  A8               10  88 0007E 8$:    BISB2   #16, 1(R8)                                  ; 5645
                02  A8        08    AC  A0 00082         ADDW2   INCREMENT, 2(R8)                            ; 5646
                           08    AC  DD 00087           PUSHL   INCREMENT                                   ; 5647
                           10    A6  DD 0008A           PUSHL   16(R6)                                      ;
                        69           02  FB 0008D         CALLS   #2, ADD_TO_REF_COUNT                        ;
                        52     2C    A6  9E 00090         MOVAB   44(R6), COMPLST                             ; 5648
                                     53  D4 00094         CLRL    I                                           ; 5650
                                     0A  11 00096         BRB     10$                                         ;
                           08    AC  DD 00098 9$:    PUSHL   INCREMENT                                   ;
                        FC A243      DD 0009B           PUSHL   -4(COMPLST)[I]                              ;
                        69           02  FB 0009F         CALLS   #2, ADD_TO_REF_COUNT                        ;
            F1          53     28    A6  F3 000A2 10$:    AOBLEQ  40(R6), I, 9$                               ;
                01  A8               10  8A 000A7         BICB2   #16, 1(R8)                                  ; 5652
                                     32  11 000AB 11$:    BRB     17$                                         ; 5591
                           08    AC  DD 000AD 12$:    PUSHL   INCREMENT                                   ; 5661
                           10    A6  DD 000B0           PUSHL   16(R6)                                      ;
                        69           02  FB 000B3         CALLS   #2, ADD_TO_REF_COUNT                        ;
                        54     18    A6  9E 000B6         MOVAB   24(R6), VARSETTBL                           ; 5662
```

```
                                        57  D4 000BA          CLRL    I                                       ; 5665
                                        1C  11 000BC          BRB     16$
                                FC A447 D0 000BE 13$:         MOVL    -4(VARSETTBL)[I], VARPTR
                            08    A3  9E 000C3              MOVAB   8(R3), COMPLST                          ; 5666
                                        55  D4 000C7          CLRL    J                                       ; 5668
                                        0A  11 000C9          BRB     15$
                                08  AC  DD 000CB 14$:         PUSHL   INCREMENT
                                FC A245 DD 000CE              PUSHL   -4(COMPLST)[J]
                                        02  FB 000D2          CALLS   #2, ADD_TO_REF_COUNT
                        F1      04  A3  F3 000D5 15$:         AOBLEQ  4(VARPTR), J, 14$
                        DF      08  A6  F3 000DA 16$:         AOBLEQ  8(R6), I, 13$                           ; 5663
                        20          0A  E1 000DF 17$:         BBC     #10, (R8), 19$                          ; 5686
                            08  A6  D0 000E3              MOVL    8(R6), INVOCPTR                         ; 5689
                            14  A2  91 000E7              CMPB    20(INVOCPTR), #12                       ; 5690
                                        13  13 000EB          BEQL    18$
                    00000000'   EF  9F 000ED              PUSHAB  P.AEC                                   ; 5692
                                        01  DD 000F3          PUSHL   #1
                    00028362    8F  DD 000F5              PUSHL   #164706
                                        03  FB 000FB          CALLS   #3, LIB$SIGNAL
                16  A2      08  AC  A0 000FE 18$:         ADDW2   INCREMENT, 22(INVOCPTR)                 ; 5694
                                        04  00103 19$:        RET                                             ; 5702

; Routine Size:  260 bytes,    Routine Base:  DBG$CODE + 25D4
```

```
;  5607          5703  1 ROUTINE CHECK_DUPLICATE(CANDLST, INDEX1, INDEX2, ARRAY_FLAG) =
;  5608          5704  1 !
;  5609          5705  1 !  FUNCTION
;  5610          5706  1 !        This routine is called from the SCOPE_RULE_XXX routines to try
;  5611          5707  1 !        to resolve a potential ambiguity. That is, we have two candidate
;  5612          5708  1 !        RST entries which are in scope and appear to be equally good.
;  5613          5709  1 !        But before signalling "NOUNIQUE" we may want to do some further
;  5614          5710  1 !        checking.
;  5615          5711  1 !
;  5616          5712  1 !        One check is for these being static data having the same address.
;  5617          5713  1 !        In this case, the duplicate RST entries really refer to the same
;  5618          5714  1 !        entity and we can pick one arbitrarily. This situation arises
;  5619          5715  1 !        with FORTRAN common blocks.
;  5620          5716  1 !
;  5621          5717  1 !        Another situation where this arises is in BLISS, where the compiler
;  5622          5718  1 !        will put out two DST records in the same scope in situations
;  5623          5719  1 !        of the form:
;  5624          5720  1 !
;  5625          5721  1 !        BEGIN
;  5626          5722  1 !        LOCAL X;
;  5627          5723  1 !        ...
;  5628          5724  1 !            BEGIN
;  5629          5725  1 !            LOCAL X;
;  5630          5726  1 !            ...
;  5631          5727  1 !            END;
;  5632          5728  1 !        END;
;  5633          5729  1 !
;  5634          5730  1 !        Here there really is an ambiguity which the BLISS compiler should
;  5635          5731  1 !        resolve by putting out block-begin block-end records, but since
;  5636          5732  1 !        it doesn't, we arbitrarily resolve the ambiguity by picking the
;  5637          5733  1 !        last X. The same situation can arise with "MAP X".
;  5638          5734  1 !
;  5639          5735  1 !        Another situation where this arises, also in BLISS, is where the
;  5640          5736  1 !        same field definition occurs in many modules (perhaps because of
;  5641          5737  1 !        REQUIRE or LIBRARY). Instead of signalling "NOUNIQUE" on this,
;  5642          5738  1 !        we check for the field definitions having identical values,
;  5643          5739  1 !        and if so, just return one of the RST pointers arbitrarily.
;  5644          5740  1 !
;  5645          5741  1 ! INPUTS
;  5646          5742  1 !        CANDBLK - A list of candidate blocks.
;  5647          5743  1 !
;  5648          5744  1 !        INDEX1  - Index into the candidate list for the first candidate.
;  5649          5745  1 !
;  5650          5746  1 !        INDEX2  - Index into the candidate list for the second candidate.
;  5651          5747  1 !
;  5652          5748  1 !        ARRAY_FLAG - If true, the symbol we are looking up was seen in a
;  5653          5749  1 !                     subscripted expression. This may be used to resolve
;  5654          5750  1 !                     possible ambiguities in BASIC, where it is legal to
;  5655          5751  1 !                     have two variables of the same name, one a scalar
;  5656          5752  1 !                     and one an array.
;  5657          5753  1 !
;  5658          5754  1 ! OUTPUTS
;  5659          5755  1 !        Return value is one of:
;  5660          5756  1 !
;  5661          5757  1 !        -1 : Indicates that there really is an ambiguity
;  5662          5758  1 !
;  5663          5759  1 !        one of the input parameters : means that the ambiguity was resolved
```

```
;  5664     5760  1 !       and this one was chosen.
;  5665     5761  1 !
;  5666     5762  2     BEGIN
;  5667     5763  2
;  5668     5764  2     MAP
;  5669     5765  2         CANDLST: REF VECTOR[,LONG];
;  5670     5766  2
;  5671     5767  2     LOCAL
;  5672     5768  2         ARR_FLAG,
;  5673     5769  2         BLITRLR1: REF DST$BLI_TRAILER1, ! Pointer to Bliss DST record trailer
;  5674     5770  2         BLITRLR2: REF DST$BLI_TRAILER1, ! Pointer to Bliss DST record trailer
;  5675     5771  2         CANDBLK1: REF CAND_BLOCKVECTOR,
;  5676     5772  2         CANDBLK2: REF CAND_BLOCKVECTOR,
;  5677     5773  2         COUNT1,                         ! Count of BLISS field values
;  5678     5774  2         COUNT2,                         ! Count of BLISS field values
;  5679     5775  2         DSTPTR1: REF DST$RECORD,        ! Pointer to first DST record
;  5680     5776  2         DSTPTR2: REF DST$RECORD,        ! Pointer to second DST record
;  5681     5777  2         FCODE1,                         ! fcode for first RST entry
;  5682     5778  2         FCODE2,                         ! fcode for second RST entry
;  5683     5779  2         PTR1,                           ! Pointer to BLISS field values
;  5684     5780  2         PTR2,                           ! Pointer to BLISS field values
;  5685     5781  2         RSTPTR1: REF RST$ENTRY,         ! Pointer to first RST entry
;  5686     5782  2         RSTPTR2: REF RST$ENTRY,         ! Pointer to second RST entry
;  5687     5783  2         TMPRSTPTR: REF RST$ENTRY,       ! Pointer to scratch RST entry
;  5688     5784  2         TYPEID1,                        ! typeid for first RST entry
;  5689     5785  2         TYPEID2;                        ! typeid for second RST entry
;  5690     5786  2
;  5691     5787  2
;  5692     5788  2     BUILTIN
;  5693     5789  2         ACTUALCOUNT;
;  5694     5790  2
;  5695     5791  2
;  5696     5792  2
;  5697     5793  2     ! Set up the flag which says whether we are looking up a subscripted
;  5698     5794  2     ! symbol.
;  5699     5795  2     !
;  5700     5796  2     IF ACTUALCOUNT() GTR 3
;  5701     5797  2     THEN
;  5702     5798  2         ARR_FLAG = .ARRAY_FLAG
;  5703     5799  2
;  5704     5800  2     ELSE
;  5705     5801  2         ARR_FLAG = FALSE;
;  5706     5802  2
;  5707     5803  2
;  5708     5804  2     ! Obtain the RST entries for the two potentially duplicate symbols.
;  5709     5805  2     !
;  5710     5806  2     CANDBLK1 = .CANDLST[.INDEX1];
;  5711     5807  2     CANDBLK2 = .CANDLST[.INDEX2];
;  5712     5808  2     RSTPTR1 = .CANDBLK1[0, CAND_RSTPTR];
;  5713     5809  2     RSTPTR2 = .CANDBLK2[0, CAND_RSTPTR];
;  5714     5810  2
;  5715     5811  2
;  5716     5812  2     ! The first thing we check for is whether these are two data items
;  5717     5813  2     ! with the same static address, or two literals or enumeration
;  5718     5814  2     ! elements with the same value.
;  5719     5815  2     !
;  5720     5816  2     IF (.RSTPTR1[RST$B_KIND] EQL RST$K_DATA) AND
```

```
;  5721          5817  3        (.RSTPTR2[RST$B_KIND] EQL RST$K_DATA)
;  5722          5818  2    THEN
;  5723          5819  2        BEGIN
;  5724          5820  3        DSTPTR1 = .RSTPTR1[RST$L_DSTPTR];
;  5725          5821  3        DSTPTR2 = .RSTPTR2[RST$L_DSTPTR];
;  5726          5822  3
;  5727          5823  3
;  5728          5824  3        ! Check for two static data items at the same address, or two
;  5729          5825  3        ! literals or enumeration elements with the same value.
;  5730          5826  3        !
;  5731          5827  4        IF (((.DSTPTR1[DST$B_TYPE] GEQ DSC$K_DTYPE_LOWEST) AND (.DSTPTR1[DST$B_TYPE] LEQ DSC$K_DTYPE_HIGHEST
;  5732          5828  4             (.DSTPTR1[DST$B_TYPE] EQL DST$K_SEPTYP) OR
;  5733          5829  4             (.DSTPTR1[DST$B_TYPE] EQL DST$K_ENUMELT) OR
;  5734          5830  4             (.DSTPTR1[DST$B_TYPE] EQL DST$K_LBLORLIT))
;  5735          5831  3                            AND
;  5736          5832  4            ((.DSTPTR1[DST$B_VFLAGS] EQL DST$K_VALKIND_ADDR) OR
;  5737          5833  4             (.DSTPTR1[DST$B_VFLAGS] EQL DST$K_VALKIND_LITERAL))
;  5738          5834  3        THEN
;  5739          5835  4            BEGIN
;  5740          5836  5            IF (((.DSTPTR2[DST$B_TYPE] GEQ DSC$K_DTYPE_LOWEST) AND (.DSTPTR2[DST$B_TYPE] LEQ DSC$K_DTYPE_HIG
;  5741          5837  5                 (.DSTPTR2[DST$B_TYPE] EQL DST$K_SEPTYP) OR
;  5742          5838  5                 (.DSTPTR2[DST$B_TYPE] EQL DST$K_ENUMELT) OR
;  5743          5839  5                 (.DSTPTR2[DST$B_TYPE] EQL DST$K_LBLORLIT))
;  5744          5840  4                            AND
;  5745          5841  5                ((.DSTPTR2[DST$B_VFLAGS] EQL DST$K_VALKIND_ADDR) OR
;  5746          5842  5                 (.DSTPTR2[DST$B_VFLAGS] EQL DST$K_VALKIND_LITERAL))
;  5747          5843  4            THEN
;  5748          5844  5                BEGIN
;  5749          5845  5                IF (.DSTPTR1[DST$B_TYPE] EQL .DSTPTR2[DST$B_TYPE]) AND
;  5750          5846  5                   (.DSTPTR1[DST$B_VFLAGS] EQL .DSTPTR2[DST$B_VFLAGS]) AND
;  5751          5847  6                   (.DSTPTR1[DST$L_VALUE] EQL .DSTPTR2[DST$L_VALUE])
;  5752          5848  5                THEN
;  5753          5849  5                    RETURN .INDEX1;
;  5754          5850  4                END;
;  5755          5851  3            END;
;  5756          5852  3
;  5757          5853  3
;  5758          5854  3        ! Check for two BLISS data items at the same address.
;  5759          5855  3        !
;  5760          5856  3        IF (.DSTPTR1[DST$B_TYPE] EQL DST$K_BLI) AND
;  5761          5857  4           (.DSTPTR2[DST$B_TYPE] EQL DST$K_BLI)
;  5762          5858  3        THEN
;  5763          5859  4            BEGIN
;  5764          5860  4            IF (.DSTPTR1[DST$B_BLI_SYM_TYPE] EQL .DSTPTR2[DST$B_BLI_SYM_TYPE]) AND
;  5765          5861  4               (.DSTPTR1[DST$B_BLI_VFLAGS] EQL DST$K_VALKIND_ADDR) AND
;  5766          5862  5               (.DSTPTR2[DST$B_BLI_VFLAGS] EQL DST$K_VALKIND_ADDR)
;  5767          5863  4            THEN
;  5768          5864  5                BEGIN
;  5769          5865  5                BLITRLR1 = DSTPTR1[DST$A_BLI_TRLR1] + .DSTPTR1[DST$B_BLI_LNG];
;  5770          5866  5                BLITRLR2 = DSTPTR2[DST$A_BLI_TRLR1] + .DSTPTR2[DST$B_BLI_LNG];
;  5771          5867  5                IF .BLITRLR1[DST$L_BLI_VALUE] EQL .BLITRLR2[DST$L_BLI_VALUE]
;  5772          5868  5                THEN
;  5773          5869  5                    RETURN .INDEX1;
;  5774          5870  4                END;
;  5775          5871  3            END;
;  5776          5872  2        END;
;  5777          5873  2
```

```
;  5778          5874  2
;  5779          5875  2      ! Check for two routines with the same address.
;  5780          5876  2      !
;  5781          5877  2      IF (.RSTPTR1[RST$B_KIND] EQL RST$K_ROUTINE) AND
;  5782          5878  3         (.RSTPTR2[RST$B_KIND] EQL RST$K_ROUTINE)
;  5783          5879  2      THEN
;  5784          5880  3          BEGIN
;  5785          5881  3          IF .RSTPTR1[RST$L_STARTADDR] EQL .RSTPTR2[RST$L_STARTADDR]
;  5786          5882  3          THEN
;  5787          5883  4              RETURN .INDEX1;
;  5788          5884  3
;  5789          5885  3          END;
;  5790          5886  2
;  5791          5887  2
;  5792          5888  2      ! Check for a routine and an entry mask which are at the same
;  5793          5889  2      ! address. This arises in PASCAL when we import a routine name
;  5794          5890  2      ! from an environment file. We see a "routine" DST in the module
;  5795          5891  2      ! where the routine is really declared. We see an "entry mask"
;  5796          5892  2      ! DST in the module where it is imported. In this case we choose
;  5797          5893  2      ! the routine DST.
;  5798          5894  2      !
;  5799          5895  2      IF (.RSTPTR1[RST$B_KIND] EQL RST$K_DATA) AND
;  5800          5896  3         (.RSTPTR2[RST$B_KIND] EQL RST$K_ROUTINE)
;  5801          5897  2      THEN
;  5802          5898  3          BEGIN
;  5803          5899  3          DSTPTR1 = .RSTPTR1[RST$L_DSTPTR];
;  5804          5900  3          IF (.DSTPTR1[DST$B_TYPE] EQL DSC$K_DTYPE_ZEM) AND
;  5805          5901  4             (.DSTPTR1[DST$B_VFLAGS] EQL DST$K_VALKIND_ADDR)
;  5806          5902  3          THEN
;  5807          5903  4              BEGIN
;  5808          5904  4              IF .DSTPTR1[DST$L_VALUE] EQL .RSTPTR2[RST$L_STARTADDR]
;  5809          5905  4              THEN
;  5810          5906  4                  RETURN .INDEX2;
;  5811          5907  3              END;
;  5812          5908  2          END;
;  5813          5909  2      IF (.RSTPTR1[RST$B_KIND] EQL RST$K_ROUTINE) AND
;  5814          5910  3         (.RSTPTR2[RST$B_KIND] EQL RST$K_DATA)
;  5815          5911  2      THEN
;  5816          5912  3          BEGIN
;  5817          5913  3          DSTPTR2 = .RSTPTR2[RST$L_DSTPTR];
;  5818          5914  3          IF (.DSTPTR2[DST$B_TYPE] EQL DSC$K_DTYPE_ZEM) AND
;  5819          5915  4             (.DSTPTR2[DST$B_VFLAGS] EQL DST$K_VALKIND_ADDR)
;  5820          5916  3          THEN
;  5821          5917  4              BEGIN
;  5822          5918  4              IF .DSTPTR2[DST$L_VALUE] EQL .RSTPTR1[RST$L_STARTADDR]
;  5823          5919  4              THEN
;  5824          5920  4                  RETURN .INDEX1;
;  5825          5921  3              END;
;  5826          5922  2          END;
;  5827          5923  2
;  5828          5924  2
;  5829          5925  2      ! Check for language BLISS.
;  5830          5926  2      !
;  5831          5927  2      TMPRSTPTR = .RSTPTR1[RST$L_UPSCOPEPTR];
;  5832          5928  2      WHILE .TMPRSTPTR[RST$B_KIND] NEQ RST$K_MODULE DO
;  5833          5929  2          TMPRSTPTR = .TMPRSTPTR[RST$L_UPSCOPEPTR];
;  5834          5930  2
```

```
;  5835          5931  2     IF .TMPRSTPTR[RST$B_LANGUAGE] EQL DBG$K_BLISS
;  5836          5932  2     THEN
;  5837          5933  3         BEGIN
;  5838          5934  3
;  5839          5935  3
;  5840          5936  3         ! Check for duplicate data entries in BLISS.
;  5841          5937  3         !
;  5842          5938  3         IF .RSTPTR1[RST$L_UPSCOPEPTR] EQL .RSTPTR2[RST$L_UPSCOPEPTR]
;  5843          5939  3         THEN
;  5844          5940  4             BEGIN
;  5845          5941  4             IF .RSTPTR1[RST$L_DSTPTR] GTR .RSTPTR2[RST$L_DSTPTR]
;  5846          5942  4             THEN
;  5847          5943  4                 RETURN .INDEX1
;  5848          5944  4
;  5849          5945  4             ELSE
;  5850          5946  4                 RETURN .INDEX2;
;  5851          5947  4
;  5852          5948  3             END;
;  5853          5949  3
;  5854          5950  3
;  5855          5951  3         ! Next, check for two occurences of the same BLISS field.
;  5856          5952  3         !
;  5857          5953  3         IF (.RSTPTR1[RST$B_KIND] EQL RST$K_DATA) AND
;  5858          5954  4            (.RSTPTR2[RST$B_KIND] EQL RST$K_DATA)
;  5859          5955  3         THEN
;  5860          5956  4             BEGIN
;  5861          5957  4             IF DBG$STA_TYPEFCODE(.RSTPTR1) EQL RST$K_TYPE_BLIFLD
;  5862          5958  4             THEN
;  5863          5959  5                 BEGIN
;  5864          5960  5                 IF DBG$STA_TYPEFCODE(.RSTPTR2) EQL RST$K_TYPE_BLIFLD
;  5865          5961  5                 THEN
;  5866          5962  6                     BEGIN
;  5867          5963  6                     DSTPTR1 = .RSTPTR1[RST$L_DSTPTR];
;  5868          5964  6                     DSTPTR2 = .RSTPTR2[RST$L_DSTPTR];
;  5869          5965  6                     COUNT1 = .DSTPTR1[DST$L_BLIFLD_COMPS];
;  5870          5966  6                     COUNT2 = .DSTPTR2[DST$L_BLIFLD_COMPS];
;  5871          5967  6                     IF .COUNT1 EQL .COUNT2
;  5872          5968  6                     THEN
;  5873          5969  7                         BEGIN
;  5874          5970  7                         PTR1 = 1 + DSTPTR1[DST$B_NAME] + .DSTPTR1[DST$B_NAME];
;  5875          5971  7                         PTR2 = 1 + DSTPTR2[DST$B_NAME] + .DSTPTR2[DST$B_NAME];
;  5876          5972  7                         IF CH$EQL(.COUNT1, .PTR1, .COUNT2, .PTR2, 0)
;  5877          5973  7                         THEN
;  5878          5974  7                             RETURN .INDEX1;
;  5879          5975  6                         END;
;  5880          5976  5                     END;
;  5881          5977  4                 END;
;  5882          5978  3             END;
;  5883          5979  2         END;
;  5884          5980  2
;  5885          5981  2
;  5886          5982  2     ! Check for language BASIC.
;  5887          5983  2     !
;  5888          5984  2     IF (.TMPRSTPTR[RST$B_LANGUAGE] EQL DBG$K_BASIC) OR
;  5889          5985  3        (.TMPRSTPTR[RST$B_LANGUAGE] EQL DBG$K_RPG)
;  5890          5986  2     THEN
;  5891          5987  3         BEGIN
```

```
;  5892          5988  3          IF (.RSTPTR1[RST$B_KIND] EQL RST$K_DATA) AND
;  5893          5989  4             (.RSTPTR2[RST$B_KIND] EQL RST$K_DATA)
;  5894          5990  3          THEN
;  5895          5991  4              BEGIN
;  5896          5992  4              DBG$STA_SETCONTEXT(.RSTPTR1);
;  5897          5993  4              DBG$STA_SYMTYPE(.RSTPTR1, FCODE1, TYPEID1);
;  5898          5994  4              DBG$STA_SETCONTEXT(.RSTPTR2);
;  5899          5995  4              DBG$STA_SYMTYPE(.RSTPTR2, FCODE2, TYPEID2);
;  5900          5996  4              IF (.FCODE1 EQL RST$K_TYPE_ARRAY) AND
;  5901          5997  5                 (.FCODE2 NEQ RST$K_TYPE_ARRAY)
;  5902          5998  4              THEN
;  5903          5999  5                  BEGIN
;  5904          6000  5                  IF .ARR_FLAG THEN RETURN .INDEX1 ELSE RETURN .INDEX2;
;  5905          6001  4                  END;
;  5906          6002  4
;  5907          6003  4              IF (.FCODE1 NEQ RST$K_TYPE_ARRAY) AND
;  5908          6004  5                 (.FCODE2 EQL RST$K_TYPE_ARRAY)
;  5909          6005  4              THEN
;  5910          6006  5                  BEGIN
;  5911          6007  5                  IF .ARR_FLAG THEN RETURN .INDEX2 ELSE RETURN .INDEX1;
;  5912          6008  4                  END;
;  5913          6009  4
;  5914          6010  3              END;
;  5915          6011  3
;  5916          6012  2          END;
;  5917          6013  2
;  5918          6014  2
;  5919          6015  2          ! If we fall through to here then we really have an ambiguity.
;  5920          6016  2          ! We indicate this by returning a -1.
;  5921          6017  2          !
;  5922          6018  2          RETURN -1;
;  5923          6019  2
;  5924          6020  1          END;


                                 0FFC 00000 CHECK_DUPLICATE:
                                                .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10,R11            ; 5703
5B 00000000G      00   9E 00002                 MOVAB   DBG$STA_SYMTYPE, R11                            ;
5E                10   C2 00009                 SUBL2   #16, SP                                         ;
03                6C   91 0000C                 CMPB    (AP), #3                                        ; 5796
                  06   1B 0000F                 BLEQU   1$                                              ;
5A            10  AC   D0 00011                 MOVL    ARRAY_FLAG, ARR_FLAG                            ; 5798
                  02   11 00015                 BRB     2$                                              ;
                  5A   D4 00017 1$:             CLRL    ARR_FLAG                                        ; 5801
57            08  AC   D0 00019 2$:             MOVL    INDEX1, R7                                      ; 5806
51            04 BC47  D0 0001D                 MOVL    @CANDLST[R7], CANDBLK1                          ;
59            0C  AC   D0 00022                 MOVL    INDEX2, R9                                      ; 5807
50            04 BC49  D0 00026                 MOVL    @CANDLST[R9], CANDBLK2                          ;
56                61   D0 0002B                 MOVL    (CANDBLK1), RSTPTR1                             ; 5808
55                60   D0 0002E                 MOVL    (CANDBLK2), RSTPTR2                             ; 5809
                  58   D4 00031                 CLRL    R8                                              ; 5816
06            14  A6   91 00033                 CMPB    20(RSTPTR1), #6                                 ;
                  7A   12 00037                 BNEQ    10$                                             ;
                  58   D6 00039                 INCL    R8                                              ;
```

```
                06      14      A5  91 0003B            CMPB    20(RSTPTR2), #6                 ; 5817
                                7F  12 0003F            BNEQ    11$
                53      0C      A6  D0 00041            MOVL    12(RSTPTR1), DSTPTR1            ; 5820
                52      0C      A5  D0 00045            MOVL    12(RSTPTR2), DSTPTR2            ; 5821
                51      01      A3  9A 00049            MOVZBL  1(DSTPTR1), R1                  ; 5827
                                05  15 0004D            BLEQ    3$
                25              51  91 0004F            CMPB    R1, #37
                                12  1B 00052            BLEQU   4$
            A3  8F              51  91 00054 3$:        CMPB    R1, #163                        ; 5828
                                0C  13 00058            BEQL    4$
            A4  8F              51  91 0005A            CMPB    R1, #164                        ; 5829
                                06  13 0005E            BEQL    4$
            BA  8F              51  91 00060            CMPB    R1, #186                        ; 5830
                                46  12 00064            BNEQ    9$
                01      02      A3  91 00066 4$:        CMPB    2(DSTPTR1), #1                  ; 5832
                                05  13 0006A            BEQL    5$
                        02      A3  95 0006C            TSTB    2(DSTPTR1)                      ; 5833
                                3B  12 0006F            BNEQ    9$
                50      01      A2  9A 00071 5$:        MOVZBL  1(DSTPTR2), R0                  ; 5836
                                05  15 00075            BLEQ    6$
                25              50  91 00077            CMPB    R0, #37
                                F2  1B 0007A            BLEQU   7$
            A3  8F              50  91 0007C 6$:        CMPB    R0, #163                        ; 5837
                                0C  13 00080            BEQL    7$
            A4  8F              50  91 00082            CMPB    R0, #164                        ; 5838
                                06  13 00086            BEQL    7$
            BA  8F              50  91 00088            CMPB    R0, #186                        ; 5839
                                1E  12 0008C            BNEQ    9$
                01      02      A2  91 0008E 7$:        CMPB    2(DSTPTR2), #1                  ; 5841
                                05  13 00092            BEQL    8$
                        02      A2  95 00094            TSTB    2(DSTPTR2)                      ; 5842
                                13  12 00097            BNEQ    9$
                50              51  D1 00099 8$:        CMPL    R1, R0                          ; 5845
                                0E  12 0009C            BNEQ    9$
            02  A2          02  A3  91 0009E            CMPB    2(DSTPTR1), 2(DSTPTR2)          ; 5846
                                07  12 000A3            BNEQ    9$
            03  A2          03  A3  D1 000A5            CMPL    3(DSTPTR1), 3(DSTPTR2)          ; 5847
                                48  13 000AA            BEQL    13$
                                51  D5 000AC 9$:        TSTL    R1                              ; 5856
                                2F  12 000AE            BNEQ    12$
                        01      A2  95 000B0            TSTB    1(DSTPTR2)                      ; 5857
                                2A  12 000B3 10$:       BNEQ    12$
            05  A2          05  A3  91 000B5            CMPB    5(DSTPTR1), 5(DSTPTR2)          ; 5860
                                23  12 000BA            BNEQ    12$
                01      04      A3  91 000BC            CMPB    4(DSTPTR1), #1                  ; 5861
                                1D  12 000C0 11$:       BNEQ    12$
                01      04      A2  91 000C2            CMPB    4(DSTPTR2), #1                  ; 5862
                                17  12 000C6            BNEQ    12$
                50      02      A3  9A 000C8            MOVZBL  2(DSTPTR1), R0                  ; 5865
                51      03  A043  9E 000CC            MOVAB   3(R0)[DSTPTR1], BLITRLR1
                50      02      A2  9A 000D1            MOVZBL  2(DSTPTR2), R0                  ; 5866
                50      03  A042  9E 000D5            MOVAB   3(R0)[DSTPTR2], BLITRLR2
                60              61  D1 000DA            CMPL    (BLITRLR1), (BLITRLR2)          ; 5867
                                7B  13 000DD            BEQL    19$
                                50  D4 000DF 12$:       CLRL    R0                              ; 5877
                02      14      A6  91 000E1            CMPB    20(RSTPTR1), #2
                                0F  12 000E5            BNEQ    14$
```

```
                                50  D6 000E7          INCL    R0                                      ;
                          02    14  A5 91 000E9       CMPB    20(RSTPTR2), #2                         ; 5878
                                07  12 000ED         BNEQ    14$                                     ;
                    18    A5    18  A6 D1 000EF       CMPL    24(RSTPTR1), 24(RSTPTR2)                ; 5881
                                64  13 000F4 13$:     BEQL    19$                                     ;
                                1D  58 E9 000F6 14$:  BLBC    R8, 15$                                 ; 5895
                          02    14  A5 91 000F9       CMPB    20(RSTPTR2), #2                         ; 5896
                                17  12 000FD         BNEQ    15$                                     ;
                                53  0C A6 D0 000FF    MOVL    12(RSTPTR1), DSTPTR1                    ; 5899
                                17  01 A3 91 00103    CMPB    1(DSTPTR1), #23                         ; 5900
                                0D  12 00107         BNEQ    15$                                     ;
                                01  02 A3 91 00109    CMPB    2(DSTPTR1), #1                          ; 5901
                                07  12 0010D         BNEQ    15$                                     ;
                    18    A5    03  A3 D1 0010F       CMPL    3(DSTPTR1), 24(RSTPTR2)                 ; 5904
                                47  13 00114         BEQL    20$                                     ;
                                1D  50 E9 00116 15$:  BLBC    R0, 16$                                 ; 5909
                          06    14  A5 91 00119       CMPB    20(RSTPTR2), #6                         ; 5910
                                17  12 0011D         BNEQ    16$                                     ;
                                52  0C A5 D0 0011F    MOVL    12(RSTPTR2), DSTPTR2                    ; 5913
                                17  01 A2 91 00123    CMPB    1(DSTPTR2), #23                         ; 5914
                                0D  12 00127         BNEQ    16$                                     ;
                                01  02 A2 91 00129    CMPB    2(DSTPTR2), #1                          ; 5915
                                07  12 0012D         BNEQ    16$                                     ;
                    18    A6    03  A2 D1 0012F       CMPL    3(DSTPTR2), 24(RSTPTR1)                 ; 5918
                                24  13 00134         BEQL    19$                                     ;
                                54  10 A6 D0 00136 16$:  MOVL    16(RSTPTR1), TMPRSTPTR              ; 5927
                                01  14 A4 91 0013A 17$:  CMPB    20(TMPRSTPTR), #1                   ; 5928
                                06  13 0013E         BEQL    18$                                     ;
                                54  10 A4 D0 00140    MOVL    16(TMPRSTPTR), TMPRSTPTR                ; 5929
                                F4  11 00144         BRB     17$                                     ;
                                02  29 A4 91 00146 18$:  CMPB    41(TMPRSTPTR), #2                   ; 5931
                                68  12 0014A         BNEQ    22$                                     ;
                          10    A5  10 A6 D1 0014C    CMPL    16(RSTPTR1), 16(RSTPTR2)                ; 5938
                                0D  12 00151         BNEQ    21$                                     ;
                          0C    A5  0C A6 D1 00153    CMPL    12(RSTPTR1), 12(RSTPTR2)                ; 5941
                                03  15 00158         BLEQ    20$                                     ;
                                00B6 31 0015A 19$:    BRW     26$                                     ;
                                00AF 31 0015D 20$:    BRW     25$                                     ;
                                51  58 E9 00160 21$:  BLBC    R8, 22$                                 ; 5953
                                06  14 A5 91 00163    CMPB    20(RSTPTR2), #6                         ; 5954
                                4B  12 00167         BNEQ    22$                                     ;
                                56  DD 00169         PUSHL   RSTPTR1                                 ; 5957
                00000000G       00  01 FB 0016B       CALLS   #1, DBG$STA_TYPEFCODE                   ;
                                0E  50 D1 00172       CMPL    R0, #14                                 ;
                                3D  12 00175         BNEQ    22$                                     ;
                                55  DD 00177         PUSHL   RSTPTR2                                 ; 5960
                00000000G       00  01 FB 00179       CALLS   #1, DBG$STA_TYPEFCODE                   ;
                                0E  50 D1 00180       CMPL    R0, #14                                 ;
                                2F  12 00183         BNEQ    22$                                     ;
                                53  0C A6 D0 00185    MOVL    12(RSTPTR1), DSTPTR1                    ; 5963
                                52  0C A5 D0 00189    MOVL    12(RSTPTR2), DSTPTR2                    ; 5964
                                58  03 A3 D0 0018D    MOVL    3(DSTPTR1), COUNT1                      ; 5965
                                51  03 A2 D0 00191    MOVL    3(DSTPTR2), COUNT2                      ; 5966
                                51  58 D1 00195       CMPL    COUNT1, COUNT2                          ; 5967
                                1A  12 00198         BNEQ    22$                                     ;
                                50  07 A3 9A 0019A    MOVZBL  7(DSTPTR1), R0                          ; 5970
                                50  08 A043 9E 0019E  MOVAB   8(R0)[DSTPTR1], PTR1                    ;
```

```
                                53      07   A2   9A 001A3          MOVZBL  7(DSTPTR2), R3                                  ; 5971
                                52      08 A342   9E 001A7          MOVAB   8(R3)[DSTPTR2], PTR2
          51            00              60        2D 001AC          CMPC5   COUNT1, (PTR1), #0, COUNT2, (PTR2)              ; 5972
                                                  62 001B1
                                                  5F 13 001B2          BEQL    26$
                                04      29   A4   91 001B4 22$:       CMPB    41(TMPRSTPTR), #4                               ; 5984
                                                  06 13 001B8          BEQL    23$
                                08      29   A4   91 001BA          CMPB    41(TMPRSTPTR), #8                               ; 5985
                                                  57 12 001BE          BNEQ    27$
                                06      14   A6   91 001C0 23$:       CMPB    20(RSTPTR1), #6                                 ; 5988
                                                  51 12 001C4          BNEQ    27$
                                06      14   A5   91 001C6          CMPB    20(RSTPTR2), #6                                 ; 5989
                                                  4B 12 001CA          BNEQ    27$
                                                  56 DD 001CC          PUSHL   RSTPTR1                                         ; 5992
                      EEE4      CF              01 FB 001CE          CALLS   #1, DBG$STA_SETCONTEXT
                                                  5E DD 001D3          PUSHL   SP                                              ; 5993
                                08      AE   9F   001D5          PUSHAB  FCODE1
                                                  56 DD 001D8          PUSHL   RSTPTR1
                                6B                03 FB 001DA          CALLS   #3, DBG$STA_SYMTYPE
                                                  55 DD 001DD          PUSHL   RSTPTR2                                         ; 5994
                      EED3      CF              01 FB 001DF          CALLS   #1, DBG$STA_SETCONTEXT
                                08      AE   9F   001E4          PUSHAB  TYPEID2                                         ; 5995
                                10      AE   9F   001E7          PUSHAB  FCODE2
                                                  55 DD 001EA          PUSHL   RSTPTR2
                                6B                03 FB 001EC          CALLS   #3, DBG$STA_SYMTYPE
                                01      04   AE   D1 001EF          CMPL    FCODE1, #1                                      ; 5996
                                                  0B 12 001F3          BNEQ    24$
                                01      0C   AE   D1 001F5          CMPL    FCODE2, #1                                      ; 5997
                                                  05 13 001F9          BEQL    24$
                                11                5A E9 001FB          BLBC    ARR_FLAG, 25$                                   ; 6000
                                                  13 11 001FE          BRB     26$
                                01      04   AE   D1 00200 24$:       CMPL    FCODE1, #1                                      ; 6003
                                                  11 13 00204          BEQL    27$
                                01      0C   AE   D1 00206          CMPL    FCODE2, #1                                      ; 6004
                                                  0B 12 0020A          BNEQ    27$
                                04                5A E9 0020C          BLBC    ARR_FLAG, 26$                                   ; 6007
                                50                59 D0 0020F 25$:       MOVL    R9, R0
                                                  04 00212             RET
                                50                57 D0 00213 26$:       MOVL    R7, R0
                                                  04 00216             RET
                                50                01 CE 00217 27$:       MNEGL   #1, R0                                          ; 6018
                                                  04 0021A             RET                                                     ; 6020

; Routine Size:  539 bytes,    Routine Base:  DBG$CODE + 26D8
```

```
;  5926          6021  1 ROUTINE EVAL_MAT_SPEC(MSPTR, VALPTR, VALKIND): NOVALUE =
;  5927          6022  1 !
;  5928          6023  1 ! FUNCTION
;  5929          6024  1 !       This routine evaluates a Materialization Spec.  Materialization Specs
;  5930          6025  1 !       are found inside certain kinds of Value Specs when more complex computa-
;  5931          6026  1 !       tions are needed to produce a symbol's value.  In particular, they are
;  5932          6027  1 !       used when a call on a compiler-provided run-time routine or an invoca-
;  5933          6028  1 !       tion of the DST stack machine is used to compute the value.
;  5934          6029  1 !
;  5935          6030  1 ! INPUTS
;  5936          6031  1 !       MSPTR   - Pointer to the Materialization Spec to be evaluated.
;  5937          6032  1 !
;  5938          6033  1 !       VALPTR  - The address of a three-longword vector to receive the value
;  5939          6034  1 !                 pointer and the corresponding stack frame pointer.
;  5940          6035  1 !
;  5941          6036  1 !       VALKIND - The address of a longword location to receive the value kind.
;  5942          6037  1 !
;  5943          6038  1 ! OUTPUTS
;  5944          6039  1 !       VALPTR  - A pointer to the desired value is returned to VALPTR.  The
;  5945          6040  1 !                 byte address of the value is returned to VALPTR[0] and the
;  5946          6041  1 !                 bit offset from that address is returned to VALPTR[1].  The
;  5947          6042  1 !                 corresponding stack Frame Pointer is returned to VALPTR[2].
;  5948          6043  1 !                 VALPTR[2] will contain zero if no frame pointer is applicable.
;  5949          6044  1 !
;  5950          6045  1 !       VALKIND - The kind of the value pointed to by VALPTR is returned to
;  5951          6046  1 !                 VALKIND.  These are the possible values:
;  5952          6047  1 !
;  5953          6048  1 !                       DBG$K_VAL_LITERAL - VALPTR points to a literal value.
;  5954          6049  1 !                       DBG$K_VAL_ADDR    - VALPTR contains an address.
;  5955          6050  1 !                       DBG$K_VAL_DESCR   - VALPTR contains the address of a
;  5956          6051  1 !                                           descriptor.
;  5957          6052  1 !
;  5958          6053  1 !       No value is returned by EVAL_MAT_SPEC.
;  5959          6054  1 !
;  5960          6055  1
;  5961          6056  2     BEGIN
;  5962          6057  2
;  5963          6058  2     MAP
;  5964          6059  2         MSPTR: REF DST$MATER_SPEC,      ! Pointer to the materialization spec
;  5965          6060  2         VALPTR: REF VECTOR[3],          ! Pointer to value pointer vector
;  5966          6061  2         VALKIND: REF VECTOR[1];         ! Pointer to value kind location
;  5967          6062  2
;  5968          6063  2     LOCAL
;  5969          6064  2         VALLOC: REF VECTOR[,LONG],      ! Pointer to value as computed by the
;  5970          6065  2                                         !       mechanism specified in the spec
;  5971          6066  2         REGNUM;                         ! Register number
;  5972          6067  2
;  5973          6068  2
;  5974          6069  2
;  5975          6070  2     ! Determine what kind of materialization spec we have.  Compute the value
;  5976          6071  2     ! of each kind as appropriate.
;  5977          6072  2     !
;  5978          6073  2     CASE .MSPTR[DST$B_MS_MECH] FROM DST$K_MS_MECH_MIN TO DST$K_MS_MECH_MAX OF
;  5979          6074  2         SET
;  5980          6075  2
;  5981          6076  2
;  5982          6077  2         ! Routine Call mechanism spec.  Call a run-time routine provided by the
```

```
;  5983          6078  2          ! compiler in the user image to compute the desired value.
;  5984          6079  2          !
;  5985          6080  2          [DST$K_MS_MECH_RTNCALL]:
;  5986          6081  3              BEGIN
;  5987          6082  3              VALPTR[2] = .DBG$REG_VALUES[13];
;  5988          6083  3              VALLOC = DBG$GET_TEMPMEM(4);
;  5989          6084  3              VALSPEC_ROUT_CALL(.VALLOC, .MSPTR[DST$L_MS_MECH_RTNADDR],
;  5990          6085  3                                .MSPTR[DST$V_MS_DUMARG], TRUE);
;  5991          6086  2              END;
;  5992          6087  2
;  5993          6088  2
;  5994          6089  2          ! Routine Call mechanism spec.  Call a run-time routine provided by the
;  5995          6090  2          ! compiler in the user image to compute the desired value. This differs
;  5996          6091  2          ! from the above RTNCALL case only in that the FP is not passed into
;  5997          6092  2          ! the thunk. The last parameter to VALSPEC_ROUT_CALL is a flag indicating
;  5998          6093  2          ! this.
;  5999          6094  2          !
;  6000          6095  2          [DST$K_MS_MECH_RTN_NOFP]:
;  6001          6096  3              BEGIN
;  6002          6097  3              VALPTR[2] = .DBG$REG_VALUES[13];
;  6003          6098  3              VALLOC = DBG$GET_TEMPMEM(4);
;  6004          6099  3              VALSPEC_ROUT_CALL(.VALLOC, .MSPTR[DST$L_MS_MECH_RTNADDR],
;  6005          6100  3                                .MSPTR[DST$V_MS_DUMARG], FALSE);
;  6006          6101  2              END;
;  6007          6102  2
;  6008          6103  2
;  6009          6104  2          ! Stack machine mechanism spec.  Use the DST "stack machine" to compute
;  6010          6105  2          ! the desired value.
;  6011          6106  2          !
;  6012          6107  2          [DST$K_MS_MECH_STK]:
;  6013          6108  2              STACK_MACHINE(MSPTR[DST$A_MS_MECH_SPEC], VALLOC, VALPTR[2]);
;  6014          6109  2
;  6015          6110  2
;  6016          6111  2          ! Any other value is an error.
;  6017          6112  2          !
;  6018          6113  2          [OUTRANGE]:
;  6019          6114  2              SIGNAL(DBG$_INVDSTREC);
;  6020          6115  2
;  6021          6116  2          TES;
;  6022          6117  2
;  6023          6118  2
;  6024          6119  2      ! We have now computed the value.  Return the value and the value kind to
;  6025          6120  2      ! the caller.
;  6026          6121  2      !
;  6027          6122  2      CASE .MSPTR[DST$B_MS_KIND] FROM DST$K_MS_BYTADDR TO DST$K_MS_DSC OF
;  6028          6123  2          SET
;  6029          6124  2
;  6030          6125  2
;  6031          6126  2          ! We have a byte address.
;  6032          6127  2          !
;  6033          6128  2          [DST$K_MS_BYTADDR]:
;  6034          6129  3              BEGIN
;  6035          6130  3              VALPTR[0] = .VALLOC[0];
;  6036          6131  3              VALPTR[1] = 0;
;  6037          6132  3              VALKIND[0] = DBG$K_VAL_ADDR;
;  6038          6133  2              END;
;  5039          6134  2
```

```
;  6040     6135  2
;  6041     6136  2          ! We have a bit address, i.e. a byte address with a bit offset.
;  6042     6137  2          !
;  6043     6138  2          [DST$K_MS_BITADDR]:
;  6044     6139  2              BEGIN
;  6045     6140  2              VALPTR[0] = .VALLOC[0];
;  6046     6141  2              VALPTR[1] = .VALLOC[1];
;  6047     6142  2              VALKIND[0] = DBG$K_VAL_ADDR;
;  6048     6143  2              END;
;  6049     6144  2
;  6050     6145  2
;  6051     6146  2          ! We have a bit offset.
;  6052     6147  2          !
;  6053     6148  2          [DST$K_MS_BITOFFS]:
;  6054     6149  2              BEGIN
;  6055     6150  2              VALPTR[0] = .VALLOC[0]/8;
;  6056     6151  2              VALPTR[1] = .VALLOC[0] AND 7;
;  6057     6152  2              VALKIND[0] = DBG$K_VAL_ADDR;
;  6058     6153  2              END;
;  6059     6154  2
;  6060     6155  2
;  6061     6156  2          ! We have an "R-value", i.e a literal or constant value.
;  6062     6157  2          !
;  6063     6158  2          [DST$K_MS_RVAL]:
;  6064     6159  2              BEGIN
;  6065     6160  2              VALPTR[0] = VALLOC[0];
;  6066     6161  2              VALPTR[1] = 0;
;  6067     6162  2              VALKIND[0] = DBG$K_VAL_LITERAL;
;  6068     6163  2              END;
;  6069     6164  2
;  6070     6165  2
;  6071     6166  2          ! We have a register number.  Convert it into a pointer into the regis-
;  6072     6167  2          ! ter value vector.
;  6073     6168  2          !
;  6074     6169  2          [DST$K_MS_REG]:
;  6075     6170  2              BEGIN
;  6076     6171  2              REGNUM = .VALLOC[0];
;  6077     6172  2              IF (.REGNUM LSS 0) OR (.REGNUM GTR 15) THEN SIGNAL(DBG$_INVDSTREC);
;  6078     6173  2              IF .DBG$REG_VECTOR[.REGNUM] EQL 0 THEN VALSPEC_SCOPE_ERROR();
;  6079     6174  2              VALPTR[0] = DBG$REG_VALUES[.REGNUM];
;  6080     6175  2              VALPTR[1] = 0;
;  6081     6176  2              VALPTR[2] = .DBG$REG_VALUES[13];
;  6082     6177  2              VALKIND[0] = DBG$K_VAL_ADDR;
;  6083     6178  2              END;
;  6084     6179  2
;  6085     6180  2
;  6086     6181  2          ! We have a descriptor address.
;  6087     6182  2          !
;  6088     6183  2          [DST$K_MS_DSC]:
;  6089     6184  2              BEGIN
;  6090     6185  2              VALPTR[0] = VALLOC[0];
;  6091     6186  2              VALPTR[1] = 0;
;  6092     6187  2              VALKIND[0] = DBG$K_VAL_DESCR;
;  6093     6188  2              END;
;  6094     6189  2
;  6095     6190  2
;  6096     6191  2          ! Any other value is an error.
```

```
;  6097          6192  2          !
;  6098          6193  2          [INRANGE, OUTRANGE]:
;  6099          6194  2              SIGNAL(DBG$_INVDSTREC);
;  6100          6195  2
;  6101          6196  2          TES;
;  6102          6197  2
;  6103          6198  2
;  6104          6199  2      ! All done--now return.
;  6105          6200  2      !
;  6106          6201  2      RETURNR;
;  6107          6202  2
;  6108          6203  1      END;


                                003C 00000 EVAL_MAT_SPEC:
                                           .WORD   Save R2,R3,R4,R5                        ; 6021
                          55 00000000G   00  9E 00002          MOVAB   DBG$GET_TEMPMEM, R5
                          54 00000000G   00  9E 00009          MOVAB   LIB$SIGNAL, R4
                          53 00000000G   00  9E 00010          MOVAB   DBG$REG_VALUES+52, R3
                          5E             04  C2 00017          SUBL2   #4, SP
                          52       04    AC  D0 0001A          MOVL    MSPTR, R2               ; 6073
                       02 01       01    A2  8F 0001E          CASEB   1(R2), #1, #2
                    0025 004A         0011     00023 1$:       .WORD   2$-1$,-
                                                               5$-1$,-
                                                               3$-1$
                                0002832A   8F  DD 00029          PUSHL   #164650                 ; 6114
                             64            01  FB 0002F          CALLS   #1, LIB$SIGNAL
                                           49  11 00032          BRB     6$
                             50       08    AC  D0 00034 2$:     MOVL    VALPTR, R0             ; 6082
                          08 A0            63  D0 00038          MOVL    DBG$REG_VALUES+52, 8(R0)
                                           04  DD 0003C          PUSHL   #4                     ; 6083
                             65            01  FB 0003E          CALLS   #1, DBG$GET_TEMPMEM
                             6E            50  D0 00041          MOVL    R0, VALLOC
                                           01  DD 00044          PUSHL   #1                     ; 6084
                                           12  11 00046          BRB     4$                     ; 6085
                             50       08    AC  D0 00048 3$:     MOVL    VALPTR, R0             ; 6097
                          08 A0            63  D0 0004C          MOVL    DBG$REG_VALUES+52, 8(R0)
                                           04  DD 00050          PUSHL   #4                     ; 6098
                             65            01  FB 00052          CALLS   #1, DBG$GET_TEMPMEM
                             6E            50  D0 00055          MOVL    R0, VALLOC
                                           7E  D4 00058          CLRL    -(SP)                  ; 6099
                7E    02 A2          01     01  EF 0005A 4$:     EXTZV   #1, #1, 2(R2), -(SP)   ; 6100
                                   03 A2       DD 00060          PUSHL   3(R2)                  ; 6099
                                   0C AE       DD 00063          PUSHL   VALLOC
                             0000V CF          04  FB 00066          CALLS   #4, VALSPEC_ROUT_CALL
                                           10  11 0006B          BRB     6$                     ; 6073
                          7E       08    AC  08  C1 0006D 5$:     ADDL3   #8, VALPTR, -(SP)      ; 6108
                                   04 AE       9F 00072          PUSHAB  VALLOC
                                   03 A2       9F 00075          PUSHAB  3(R2)
                             0000V CF          03  FB 00078          CALLS   #3, STACK_MACHINE
                       05 01             62  8F 0007D 6$:     CASEB   (R2), #1, #5           ; 6122
                0041 002F       0023     0016     00081 7$:     .WORD   8$-7$,-
                                0087     0050     00089                 9$-7$,-
                                                                       10$-7$,-
```

```
                                                                                11$-7$,-                                                        ;
                                                                                12$-7$,-                                                        ;
                                                                                17$-7$                                                          ;
                                 0002832A    8F   DD 0008D                      PUSHL   #164650                                                 ; 6194
                              64             01   FB 00093                      CALLS   #1, LIB$SIGNAL                                          ;
                                             04   00096                      RET                                                             ;
                              50       08    AC   D0 00097 8$:                MOVL    VALPTR, R0                                              ; 6130
                              60       00    BE   D0 0009B                    MOVL    @VALLOC, (R0)                                           ;
                                       04    A0   D4 0009E                    CLRL    4(R0)                                                   ; 6131
                                             5F   11 000A2                    BRB     16$                                                     ; 6132
                              51       08    AC   D0 000A4 9$:                MOVL    VALPTR, R1                                              ; 6140
                              50             6E   D0 000A8                    MOVL    VALLOC, R0                                              ;
                              61             60   7D 000AB                    MOVQ    (R0), (R1)                                              ;
                                             53   11 000AE                    BRB     16$                                                     ; 6142
                              50       08    AC   D0 000B0 10$:               MOVL    VALPTR, R0                                              ; 6150
                        60          00    BE   08   C7 000B4                  DIVL3   #8, @VALLOC, (R0)                                       ;
04    A0          00    BE                03        00   EF 000B9            EXTZV   #0, #3, @VALLOC, 4(R0)                                  ; 6151
                                             41   11 000C0                    BRB     16$                                                     ; 6152
                              50       08    AC   D0 000C2 11$:               MOVL    VALPTR, R0                                              ; 6160
                              60             6E   D0 000C6                    MOVL    VALLOC, (R0)                                            ;
                                       04    A0   D4 000C9                    CLRL    4(R0)                                                   ; 6161
                           0C          BC              01   D0 000CC          MOVL    #1, @VALKIND                                            ; 6162
                                             04   000D0                      RET                                                             ; 6122
                              52       00    BE   D0 000D1 12$:               MOVL    @VALLOC, REGNUM                                         ; 6171
                                             05   19 000D5                    BLSS    13$                                                     ; 6172
                              0F             52   D1 000D7                    CMPL    REGNUM, #15                                             ;
                                             09   15 000DA                    BLEQ    14$                                                     ;
                                 0002832A    8F   DD 000DC 13$:               PUSHL   #164650                                                 ;
                              64             01   FB 000E2                    CALLS   #1, LIB$SIGNAL                                          ;
                                 00000000G0042    D5 000E5 14$:               TSTL    DBG$REG_VECTOR[REGNUM]                                  ; 6173
                                             05   12 000EC                    BNEQ    15$                                                     ;
                        0000V    CF             00   FB 000EE                CALLS   #0, VALSPEC_SCOPE_ERROR                                 ;
                              50       08    AC   D0 000F3 15$:               MOVL    VALPTR, R0                                              ; 6174
                              60       CC A342    DE 000F7                    MOVAL   DBG$REG_VALUES[REGNUM], (R0)                            ;
                                       04    A0   D4 000FC                    CLRL    4(R0)                                                   ; 6175
                           08          A0              63   D0 000FF          MOVL    DBG$REG_VALUES+52, 8(R0)                                ; 6176
                           0C          BC              02   D0 00103 16$:     MOVL    #2, @VA[KIND                                            ; 6177
                                             04   00107                      RET                                                             ; 6122
                              50       08    AC   D0 00108 17$:               MOVL    VALPTR, R0                                              ; 6185
                              60             6E   D0 0010C                    MOVL    VALLOC, (R0)                                            ;
                                       04    A0   D4 0010F                    CLRL    4(R0)                                                   ; 6186
                           0C          BC              03   D0 00112          MOVL    #3, @VALKIND                                            ; 6187
                                             04   00116                      RET                                                             ; 6203

; Routine Size:  279 bytes,    Routine Base:  DBG$CODE + 28F3
```

```
;  6110          6204  1 ROUTINE FOLLOW_STATIC_LINK(RSTPTR, SCOPE_RSTPTR) =
;  6111          6205  1 !
;  6112          6206  1 ! FUNCTION
;  6113          6207  1 !       This routine determines the proper invocation number for a data item
;  6114          6208  1 !       which has been looked up in a specific scope.  This is accomplished by
;  6115          6209  1 !       starting with the call frame of the routine defining the scope and then
;  6116          6210  1 !       following the Static Links (in the call stack) until we get to a frame
;  6117          6211  1 !       for the routine in which the data item is declared.  The invocation
;  6118          6212  1 !       number of that routine is computed along the way, and is returned as the
;  6119          6213  1 !       invocation number of the data item.
;  6120          6214  1 !
;  6121          6215  1 !       The Static Links take us from call frame to call frame as we go up-scope
;  6122          6216  1 !       from the scope routine to the declaring routine.  Static links are spec-
;  6123          6217  1 !       ified by Value Specs in Static Link DST records.  There can be one such
;  6124          6218  1 !       record per routine.  However, if no such record is specified (BLISS, for
;  6125          6219  1 !       example, does not use them), we take the first invocation we find in the
;  6126          6220  1 !       call stack (after the current call frame) for the up-scope routine.  The
;  6127          6221  1 !       Static Link DST record always gives the right final invocation number,
;  6128          6222  1 !       but the first-invocation-we-find method works equally well in all but a
;  6129          6223  1 !       few anomalous cases.
;  6130          6224  1 !
;  6131          6225  1 ! INPUTS
;  6132          6226  1 !       RSTPTR  - Pointer to the RST entry of the object (normally a data item)
;  6133          6227  1 !                 whose invocation number is to be determined.
;  6134          6228  1 !
;  6135          6229  1 !       SCOPE_RSTPTR - Pointer to the RST entry which defines the scope in which
;  6136          6230  1 !                 the RSTPTR item is to be found.  This scope defines the invoc-
;  6137          6231  1 !                 ation of RSTPTR we want.  This routine assumes that the RSTPTR
;  6138          6232  1 !                 item is known to be in the scope defined by SCOPE_RSTPTR.
;  6139          6233  1 !
;  6140          6234  1 ! OUTPUTS
;  6141          6235  1 !       A pointer to an RST entry for the RSTPTR object is returned as the
;  6142          6236  1 !                 routine value.  This RST entry will have the proper invocation
;  6143          6237  1 !                 number for the object.  The returned pointer is identical to
;  6144          6238  1 !                 RSTPTR if the invocation number is zero.  RSTPTR is also re-
;  6145          6239  1 !                 turned unchanged if it does not point to a data object.
;  6146          6240  1 !
;  6147          6241  1
;  6148          6242  2     BEGIN
;  6149          6243  2
;  6150          6244  2     MAP
;  6151          6245  2         RSTPTR: REF RST$ENTRY,              ! Pointer to RST entry for data object
;  6152          6246  2                                             !      whose invocation number is to be
;  6153          6247  2                                             !      determined
;  6154          6248  2         SCOPE_RSTPTR: REF RST$ENTRY;        ! Pointer to the RST entry which
;  6155          6249  2                                             !      defines the scope in which
;  6156          6250  2                                             !      the object is to be found
;  6157          6251  2
;  6158          6252  2     OWN
;  6159          6253  2         SPVALUE: REF VECTOR[,LONG];         ! Current call frame's SP value
;  6160          6254  2
;  6161          6255  2     LOCAL
;  6162          6256  2         CURRENT_REG: REF VECTOR[,LONG],     ! Pointer to vector of current register
;  6163          6257  2                                             !      values (at top of stack)
;  6164          6258  2         DSTPTR: REF DST$RECORD,             ! Pointer to Static Link DST record
;  6165          6259  2         FRAME_FOUND_FLAG,                   ! Set to TRUE when a call frame for a
;  6166          6260  2                                             !      desired routine has been found
```

```
;  6167          6261  2         FRAMEPTR: REF BLOCK[,BYTE],     ! Pointer to current VAX call frame
;  6168          6262  2         INVPTR: REF RST$ENTRY,          ! Pointer to Invocation Number RST Entry
;  6169          6263  2         J,                              ! Call frame register-vector index
;  6170          6264  2         PATHNAME,                       ! Pointer to data item Pathname Descr.
;  6171          6265  2         PATHSTRING,                     ! Pointer to pathname counted ASCII
;  6172          6266  2         PCVAL,                          ! Current call frame's PC value
;  6173          6267  2         REGPTR: REF VECTOR[,LONG],      ! Pointer to a register's save location
;  6174          6268  2         REGSAVELOC: REF VECTOR[,LONG],  ! Pointer to call frame register save
;  6175          6269  2                                         !     area for registers R0 - R11
;  6176          6270  2         REGVEC: VECTOR[17,LONG],        ! Vector of pointers to save areas for
;  6177          6271  2                                         !     the current frame's registers
;  6178          6272  2         ROUTPTR: REF RST$ENTRY,         ! Pointer to RST entry for routine which
;  6179          6273  2                                         !     declares the RSTPTR data item
;  6180          6274  2         ROUT_INVOC_COUNT,               ! Invocation count of ROUTPTR routine
;  6181          6275  2         RPTR: REF RST$ENTRY,            ! Pointer to RST entry for possible
;  6182          6276  2                                         !     nested routine
;  6183          6277  2         RUNFRAME_PTR,                   ! Pointer to current entry in CALL com-
;  6184          6278  2                                         !     mand runframe stack (needed by
;  6185          6279  2                                         !     the GET_REGISTER_VALUES routine)
;  6186          6280  2         SATPTR: REF SAT$ENTRY,          ! Pointer to Static Address Table entry
;  6187          6281  2         SAVEREGSYMID,                   ! Save area for DBG$REG_SYMID
;  6188          6282  2         SAVEREGVAL: VECTOR[17,LONG],    ! Save area for DBG$REG_VALUES
;  6189          6283  2         SAVEREGVEC: VECTOR[17,LONG],    ! Save area for DBG$REG_VECTOR
;  6190          6284  2         SCOPE: REF RST$ENTRY,           ! Pointer to scope RST entry
;  6191          6285  2         SCOPE_INVOC_COUNT,              ! Invocation count of SCOPE routine
;  6192          6286  2         SCOPE_INVOC_NUM,                ! Invocation number we are looking for
;  6193          6287  2                                         !     of routine pointed to by SCOPE
;  6194          6288  2         STATIC_LINK_FP,                 ! Frame Pointer value from Static Link
;  6195          6289  2                                         !     DST record
;  6196          6290  2         VALKIND,                        ! Value kind returned by DBG$STA_VALSPEC
;  6197          6291  2         VALVECTOR: VECTOR[3,LONG];      ! Value vector returned by VALSPEC rout-
;  6198          6292  2                                         !     ine: byte address, bit offset,
;  6199          6293  2                                         !     and frame pointer value.
;  6200          6294  2
;  6201          6295  2
;  6202          6296  2
;  6203          6297  2     ! If RSTPTR does not point to a Data Item RST Entry, we return it unchanged
;  6204          6298  2     ! since invocation numbers are only meaningful for data objects.
;  6205          6299  2     !
;  6206          6300  2     IF .RSTPTR[RST$B_KIND] NEQ RST$K_DATA THEN RETURN .RSTPTR;
;  6207          6301  2
;  6208          6302  2
;  6209          6303  2     ! If the scope is anything other than a routine or a block in a routine,
;  6210          6304  2     ! it cannot have an associated invocation number.  We thus return the input
;  6211          6305  2     ! RST pointer without change.
;  6212          6306  2     !
;  6213          6307  2     IF .SCOPE_RSTPTR EQL 0 THEN RETURN .RSTPTR;
;  6214          6308  2     IF (.SCOPE_RSTPTR[RST$B_KIND] NEQ RST$K_ROUTINE) AND
;  6215          6309  3        (.SCOPE_RSTPTR[RST$B_KIND] NEQ RST$K_BLOCK)
;  6216          6310  2     THEN
;  6217          6311  2         RETURN .RSTPTR;
;  6218          6312  2
;  6219          6313  2
;  6220          6314  2     ! Get the invocation number associated with the scope RST entry.
;  6221          6315  2     !
;  6222          6316  2     SCOPE = .SCOPE_RSTPTR;
;  6223          6317  2     SCOPE_INVOC_NUM = 0;
```

```
;  6224          6318  2     IF .SCOPE[RST$V_INVOCNUM]
;  6225          6319  2     THEN
;  6226          6320  3         BEGIN
;  6227          6321  3         INVPTR = .SCOPE[RST$L_SYMCHNPTR];
;  6228          6322  3         SCOPE_INVOC_NUM = .INVPTR[RST$L_INVOCNUM];
;  6229          6323  3         SCOPE = .INVPTR[RST$L_UPSCOPEPTR];
;  6230          6324  3         END;
;  6231          6325  2
;  6232          6326  2
;  6233          6327  2     ! If SCOPE points to a lexical block, find the nearest up-scope routine.
;  6234          6328  2     ! This is the routine to which the scope's invocation number applies.
;  6235          6329  2     !
;  6236          6330  2     WHILE .SCOPE[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  6237          6331  3         BEGIN
;  6238          6332  3         IF .SCOPE[RST$B_KIND] EQL RST$K_MODULE THEN RETURN .RSTPTR;
;  6239          6333  3         SCOPE = .SCOPE[RST$L_UPSCOPEPTR];
;  6240          6334  3         END;
;  6241          6335  2
;  6242          6336  2
;  6243          6337  2     ! Get a pointer to the RST entry for the innermost routine up-scope from
;  6244          6338  2     ! the data object RST entry.  This is the routine which immediately contains
;  6245          6339  2     ! the desired data object.
;  6246          6340  2     !
;  6247          6341  2     ROUTPTR = .RSTPTR;
;  6248          6342  2     WHILE .ROUTPTR[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  6249          6343  3         BEGIN
;  6250          6344  3         IF .ROUTPTR[RST$B_KIND] EQL RST$K_MODULE THEN RETURN .RSTPTR;
;  6251          6345  3         ROUTPTR = .ROUTPTR[RST$L_UPSCOPEPTR];
;  6252          6346  3         END;
;  6253          6347  2
;  6254          6348  2
;  6255          6349  2     ! If that innermost routine is the desired scope, we build a new RST entry
;  6256          6350  2     ! for the data item with the scope's invocation number and return that.
;  6257          6351  2     !
;  6258          6352  2     IF .ROUTPTR EQL .SCOPE
;  6259          6353  2     THEN
;  6260          6354  3         BEGIN
;  6261          6355  3         IF .SCOPE_INVOC_NUM EQL 0 THEN RETURN .RSTPTR;
;  6262          6356  3         RETURN DBG$BUILD_INVOC_RST(.RSTPTR, .SCOPE_INVOC_NUM);
;  6263          6357  3         END;
;  6264          6358  2
;  6265          6359  2
;  6266          6360  2     ! The innermost routine and the desired scope are different.  We must thus
;  6267          6361  2     ! go through the VAX call stack to find the proper ROUTPTR frame to go with
;  6268          6362  2     ! the SCOPE we are starting with.  This requires us to follow static links
;  6269          6363  2     ! where present to do the up-level addressing correctly.
;  6270          6364  2     !
;  6271          6365  2     ! We start by initializing the current stack frame's Program Counter (PC),
;  6272          6366  2     ! Frame Pointer (FP), and other register values.  We also initialize the
;  6273          6367  2     ! pointer into the CALL command runframe-stack.
;  6274          6368  2     !
;  6275          6369  2     PCVAL = .DBG$RUNFRAME[DBG$L_USER_PC];
;  6276          6370  2     FRAMEPTR = .DBG$RUNFRAME[DBG$L_USER_FP];
;  6277          6371  2     CURRENT_REG = DBG$RUNFRAME[DBG$L_USER_REGS];
;  6278          6372  2     RUNFRAME_PTR = .DBG$RUNFRAME[DBG$L_NEXT_LINK];
;  6279          6373  2     INCR I FROM 0 TO 16 DO REGVEC[.I] = CURRENT_REG[.I];
;  6280          6374  2
```

```
;  6281          6375  2
;  6282          6376  2        ! Search through the VAX call stack looking for the SCOPE routine's call
;  6283          6377  2        ! frame and then the ROUTPTR call frame up-scope from it.  Pick up all
;  6284          6378  2        ! register save area addresses in the stack along the way.
;  6285          6379  2        !
;  6286          6380  2        ROUT_INVOC_COUNT = 0;
;  6287          6381  2        SCOPE_INVOC_COUNT = 0;
;  6288          6382  2        STATIC_LINK_FP = 0;
;  6289          6383  2        WHILE TRUE DO
;  6290          6384  3            BEGIN
;  6291          6385  3
;  6292          6386  3
;  6293          6387  3            ! If we got to the bottom of the stack without finding the desired
;  6294          6388  3            ! invocation of the ROUTPTR routine, report an error.
;  6295          6389  3            !
;  6296          6390  4            IF (.PCVAL EQL 0) OR (.FRAMEPTR[SF$A_HANDLER] EQL DBG$FINAL_HANDL)
;  6297          6391  3            THEN
;  6298          6392  4                BEGIN
;  6299          6393  4                DBG$STA_SYMPATHNAME(.RSTPTR, PATHNAME);
;  6300          6394  4                DBG$NPATHDESC_TO_CS(.PATHNAME, PATHSTRING);
;  6301          6395  4                SIGNAL(DBG$_PROFRANOT, 1, .PATHSTRING);
;  6302          6396  3                END;
;  6303          6397  3
;  6304          6398  3
;  6305          6399  3            ! Check to see if the current call frame is a frame for the routine
;  6306          6400  3            ! currently pointed to by SCOPE.  If so, find the static link (if any)
;  6307          6401  3            ! and make SCOPE point to the RST entry of the routine immediately
;  6308          6402  3            ! up-scope from the routine currently pointed to by SCOPE.
;  6309          6403  3            !
;  6310          6404  3            IF (.PCVAL GEQU .SCOPE[RST$L_STARTADDR]) AND
;  6311          6405  4               (.PCVAL LEQU .SCOPE[RST$L_ENDADDR])
;  6312          6406  3            THEN
;  6313          6407  4                BEGIN
;  6314          6408  4
;  6315          6409  4
;  6316          6410  4                ! The current PC value is in the range of the SCOPE routine, so we
;  6317          6411  4                ! set FRAME_FOUND_FLAG.  However, this frame could actually be for
;  6318          6412  4                ! a nested routine within the SCOPE routine.  We check for that and
;  6319          6413  4                ! clear FRAME_FOUND_FLAG if that turns out to be the case.
;  6320          6414  4                !
;  6321          6415  4                FRAME_FOUND_FLAG = TRUE;
;  6322          6416  4                SATPTR = .SCOPE[RST$L_RTNSATPTR];
;  6323          6417  4
;  6324          6418  4                ! WARNING -- We can get into trouble here.  Previously, we have
;  6325          6419  4                ! assumed that the SAT is always around.  This may not be the
;  6326          6420  4                ! case if this module has been canceled.  There are times when
;  6327          6421  4                ! the module could be canceled and then set again to make us
;  6328          6422  4                ! believe the the SAT is valid for this RST, but it is not!  To
;  6329          6423  4                ! correct the problem, when a module is canceled the field
;  6330          6424  4                ! RST$L_RTNSATPTR is set to ZERO for each routine.
;  6331          6425  4                ! So if the module for this RST has been canceled, SATPTR will
;  6332          6426  4                ! be zero from the above statement. The problem is that this
;  6333          6427  4                ! assumes there are no nested routines that truly require the
;  6334          6428  4                ! correct context information.  This is, of course, WRONG.  A
;  6335          6429  4                ! way of saving and getting to the SAT information must be
;  6336          6430  4                ! found in the future.  B.A. Becker  MAY-1984
;  6337          6431  4                !
```

```
;  6338     6432  4          IF .SATPTR NEQ 0
;  6339     6433  4          THEN
;  6340     6434  4              SATPTR = .SATPTR[SAT$L_FLINK];
;  6341     6435  4
;  6342     6436  4          WHILE TRUE DO
;  6343     6437  5              BEGIN
;  6344     6438  5              IF .SATPTR EQL 0 THEN EXITLOOP;
;  6345     6439  5              IF (.PCVAL LSSU .SATPTR[SAT$L_START]) THEN EXITLOOP;
;  6346     6440  5              RPTR = .SATPTR[SAT$L_RSTPTR];
;  6347     6441  5              IF (.PCVAL LEQU .SATPTR[SAT$L_END]) AND
;  6348     6442  6                 (.RPTR[RST$B_KIND] EQL RST$K_ROUTINE)
;  6349     6443  5              THEN
;  6350     6444  6                  BEGIN
;  6351     6445  6                  FRAME_FOUND_FLAG = FALSE;
;  6352     6446  6                  EXITLOOP;
;  6353     6447  5                  END;
;  6354     6448  5
;  6355     6449  5              SATPTR = .SATPTR[SAT$L_FLINK];
;  6356     6450  4              END;
;  6357     6451  4
;  6358     6452  4
;  6359     6453  4          ! If this call frame really is for the SCOPE routine, we see if it
;  6360     6454  4          ! is the invocation we are looking for.
;  6361     6455  4          !
;  6362     6456  4          IF .FRAME_FOUND_FLAG
;  6363     6457  4          THEN
;  6364     6458  5              BEGIN
;  6365     6459  5
;  6366     6460  5
;  6367     6461  5              ! If this is the invocation we are looking for, determine which
;  6368     6462  5              ! invocation of the next routine up-scope from SCOPE to look
;  6369     6463  5              ! for next.
;  6370     6464  5              !
;  6371     6465  5              IF (.STATIC_LINK_FP EQL .FRAMEPTR) OR
;  6372     6466  6                 (.SCOPE_INVOC_COUNT EQL .SCOPE_INVOC_NUM)
;  6373     6467  5              THEN
;  6374     6468  6                  BEGIN
;  6375     6469  6
;  6376     6470  6
;  6377     6471  6                  ! This is the invocation of the SCOPE routine we want.  If
;  6378     6472  6                  ! this frame is also a frame for the ROUTPTR routine, we
;  6379     6473  6                  ! have found the call frame we want for the data item.  We
;  6380     6474  6                  ! thus exit the loop searching through the call stack.
;  6381     6475  6                  !
;  6382     6476  6                  IF .SCOPE EQL .ROUTPTR THEN EXITLOOP;
;  6383     6477  6
;  6384     6478  6
;  6385     6479  6                  ! If no Static Link DST record was specified, we want to
;  6386     6480  6                  ! look for the first invocation in the stack of the routine
;  6387     6481  6                  ! up-scope from the SCOPE routine.  We set SCOPE_INVOC_NUM
;  6388     6482  6                  ! and SCOPE_INVOC_COUNT to make this happen.
;  6389     6483  6                  !
;  6390     6484  6                  IF .SCOPE[RST$L_STATIC_LINK] EQL 0
;  6391     6485  6                  THEN
;  6392     6486  7                      BEGIN
;  6393     6487  7                      SCOPE_INVOC_NUM = 1;
;  6394     6488  7                      SCOPE_INVOC_COUNT = 0;
```

```
;  6395          6489  7                    STATIC_LINK_FP = 0;
;  6396          6490  7                    END
;  6397          6491  7
;  6398          6492  7
;  6399          6493  7                ! But if a Static Link DST record was specified for this
;  6400          6494  7                ! routine, we use the Value Spec in that DST record to pick
;  6401          6495  7                ! up the Static Link (in the form of a Frame Pointer).  We
;  6402          6496  7                ! disable looking for the first up-scope invocation.
;  6403          6497  7                !
;  6404          6498  6                ELSE
;  6405          6499  7                    BEGIN
;  6406          6500  7                    SCOPE_INVOC_NUM = 0;
;  6407          6501  7                    SCOPE_INVOC_COUNT = 0;
;  6408          6502  7
;  6409          6503  7
;  6410          6504  7                    ! Save the current register values and pointers set up
;  6411          6505  7                    ! by DBG$STA_SETCONTEXT.  Then substitute our own regis-
;  6412          6506  7                    ! ter set in the arrays used in Value Spec evaluation.
;  6413          6507  7                    !
;  6414          6508  7                    SAVEREGSYMID = .DBG$REG_SYMID;
;  6415          6509  7                    DBG$REG_SYMID = .RSTPTR;
;  6416          6510  7                    INCR I FROM 0 TO 16 DO
;  6417          6511  8                        BEGIN
;  6418          6512  8                        SAVEREGVEC[.I] = .DBG$REG_VECTOR[.I];
;  6419          6513  8                        SAVEREGVAL[.I] = .DBG$REG_VALUES[.I];
;  6420          6514  8                        DBG$REG_VECTOR[.I] = .REGVEC[.I];
;  6421          6515  8                        REGPTR = .REGVEC[.I];
;  6422          6516  8                        IF .REGPTR NEQ 0 THEN DBG$REG_VALUES[.I] = .REGPTR[0];
;  6423          6517  7                        END;
;  6424          6518  7
;  6425          6519  7
;  6426          6520  7                    ! Evaluate the Static Link Value Spec.  This produces a
;  6427          6521  7                    ! pointer to the desired up-scope call frame.
;  6428          6522  7                    !
;  6429          6523  7                    DSTPTR = .SCOPE[RST$L_STATIC_LINK];
;  6430          6524  7                    DBG$STA_VALSPEC(DSTPTR[DST$A_SL_VALSPEC],
;  6431          6525  7                                    VALVECTOR, VALKIND);
;  6432          6526  7                    STATIC_LINK_FP = .VALVECTOR[0];
;  6433          6527  7
;  6434          6528  7
;  6435          6529  7                    ! Restore the saved register values and pointers.
;  6436          6530  7                    !
;  6437          6531  7                    DBG$REG_SYMID = .SAVEREGSYMID;
;  6438          6532  7                    INCR I FROM 0 TO 16 DO
;  6439          6533  8                        BEGIN
;  6440          6534  8                        DBG$REG_VECTOR[.I] = .SAVEREGVEC[.I];
;  6441          6535  8                        DBG$REG_VALUES[.I] = .SAVEREGVAL[.I];
;  6442          6536  7                        END;
;  6443          6537  7
;  6444          6538  6                    END;            ! End of Static Link evaluation
;  6445          6539  6
;  6446          6540  6
;  6447          6541  6                ! Follow the up-scope pointer from the SCOPE routine's RST
;  6448          6542  6                ! entry to the next routine up-scope.  Set SCOPE to point
;  6449          6543  6                ! to that routine's Routine RST Entry.
;  6450          6544  6                !
;  6451          6545  6                SCOPE = .SCOPE[RST$L_UPSCOPEPTR];
```

```
;  6452     6546  6                    WHILE .SCOPE[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  6453     6547  7                        BEGIN
;  6454     6548  7                        IF .SCOPE[RST$B_KIND] EQL RST$K_MODULE
;  6455     6549  7                        THEN
;  6456     6550  7                            $DBG_ERROR('RSTACCESS\FOLLOW_STATIC_LINK');
;  6457     6551  7
;  6458     6552  7                        SCOPE = .SCOPE[RST$L_UPSCOPEPTR];
;  6459     6553  6                        END;
;  6460     6554  6
;  6461     6555  5                    END;                    ! End of STATIC_LINK_FP IF-statement
;  6462     6556  5
;  6463     6557  5
;  6464     6558  5                ! We now know what routine and frame to look for next.  Incre-
;  6465     6559  5                ! ment the invocation count for the current SCOPE routine.
;  6466     6560  5                !
;  6467     6561  5                SCOPE_INVOC_COUNT = .SCOPE_INVOC_COUNT + 1;
;  6468     6562  5
;  6469     6563  4                END;                        ! End of FRAME_FOUND_FLAG IF-statement
;  6470     6564  4
;  6471     6565  3            END;                            ! End of PCVAL in SCOPE IF-statement
;  6472     6566  3
;  6473     6567  3
;  6474     6568  3        ! Check to see if the current call frame is a frame for the ROUTPTR
;  6475     6569  3        ! routine (but not for a nested routine within the ROUTPTR routine).
;  6476     6570  3        ! If so, increment the ROUTPTR routine's invocation count.  This code
;  6477     6571  3        ! thus computes the data item's final invocation count.
;  6478     6572  3        !
;  6479     6573  3        IF (.PCVAL GEQU .ROUTPTR[RST$L_STARTADDR]) AND
;  6480     6574  4           (.PCVAL LEQU .ROUTPTR[RST$L_ENDADDR])
;  6481     6575  3        THEN
;  6482     6576  4            BEGIN
;  6483     6577  4            FRAME_FOUND_FLAG = TRUE;
;  6484     6578  4            SATPTR = .ROUTPTR[RST$L_RTNSATPTR];
;  6485     6579  4
;  6486     6580  4            ! WARNING -- We can get into trouble here.  Previously, we have
;  6487     6581  4            ! assumed that the SAT is always around.  This may not be the
;  6488     6582  4            ! case if this module has been canceled.  There are times when
;  6489     6583  4            ! the module could be canceled and then set again to make us
;  6490     6584  4            ! believe the the SAT is valid for this RST, but it is not!  To
;  6491     6585  4            ! correct the problem, when a module is canceled the field
;  6492     6586  4            ! RST$L_RTNSATPTR is set to ZERO for each routine.
;  6493     6587  4            ! So if the module for this RST has been canceled, SATPTR will
;  6494     6588  4            ! be zero from the above statement. The problem is that this
;  6495     6589  4            ! assumes there are no nested routines that truly require the
;  6496     6590  4            ! correct context information.  This is, of course, WRONG.  A
;  6497     6591  4            ! way of saving and getting to the SAT information must be
;  6498     6592  4            ! found in the future.  B.A. Becker  MAY-1984
;  6499     6593  4            !
;  6500     6594  4            IF .SATPTR NEQ 0
;  6501     6595  4            THEN
;  6502     6596  4                SATPTR = .SATPTR[SAT$L_FLINK];
;  6503     6597  4
;  6504     6598  4            WHILE TRUE DO
;  6505     6599  5                BEGIN
;  6506     6600  5                IF .SATPTR EQL 0 THEN EXITLOOP;
;  6507     6601  5                IF (.PCVAL LSSU .SATPTR[SAT$L_START]) THEN EXITLOOP;
;  6508     6602  5                RPTR = .SATPTR[SAT$L_RSTPTR];
```

```
;  6509          6603  5              IF (.PCVAL LEQU .SATPTR[SAT$L_END]) AND
;  6510          6604  6                 (.RPTR[RST$B_KIND] EQL RST$K_ROUTINE)
;  6511          6605  5              THEN
;  6512          6606  6                  BEGIN
;  6513          6607  6                  FRAME_FOUND_FLAG = FALSE;
;  6514          6608  6                  EXITLOOP;
;  6515          6609  5                  END;
;  6516          6610  5
;  6517          6611  5              SATPTR = .SATPTR[SAT$L_FLINK];
;  6518          6612  4              END;
;  6519          6613  4
;  6520          6614  4          IF .FRAME_FOUND_FLAG
;  6521          6615  4          THEN
;  6522          6616  4              ROUT_INVOC_COUNT = .ROUT_INVOC_COUNT + 1;
;  6523          6617  4
;  6524          6618  3          END;
;  6525          6619  3
;  6526          6620  3
;  6527          6621  3      ! Pick up the addresses of the register save areas in this call frame.
;  6528          6622  3      ! Save those addresses in REGVEC.  This allows us to keep track of the
;  6529          6623  3      ! current register values as we go on to the next frame in the stack.
;  6530          6624  3      !
;  6531          6625  3      GET_REGISTER_VALUES(.FRAMEPTR, RUNFRAME_PTR, REGVEC);
;  6532          6626  3
;  6533          6627  3
;  6534          6628  3      ! Determine what the value of SP (the Stack Pointer) is for the current
;  6535          6629  3      ! CALL frame and save that in the OWN variable SPVALUE.  Then make the
;  6536          6630  3      ! save-location pointer in REGVEC point to SPVALUE.  (Since SP does not
;  6537          6631  3      ! have a true save-location, the OWN variable fakes one.)
;  6538          6632  3      !
;  6539          6633  3      REGPTR = .REGVEC[14];
;  6540          6634  3      SPVALUE = .REGPTR[0];
;  6541          6635  3      REGVEC[14] = SPVALUE;
;  6542          6636  3
;  6543          6637  3
;  6544          6638  3          ! Dig out the values of PC and FP for the current CALL frame.  Then
;  6545          6639  3          ! loop for the next stack frame.
;  6546          6640  3          !
;  6547          6641  3          REGPTR = .REGVEC[15];
;  6548          6642  3          PCVAL = .REGPTR[0];
;  6549          6643  3          REGPTR = .REGVEC[13];
;  6550          6644  3          FRAMEPTR = .REGPTR[0];
;  6551          6645  3
;  6552          6646  2          END;                            ! End of loop through the call stack
;  6553          6647  2
;  6554          6648  2
;  6555          6649  2      ! We have now found the proper invocation number for the ROUTPTR routine.
;  6556          6650  2      ! We thus build an RST entry for the data item with that invocation number
;  6557          6651  2      ! (if necessary) and return a pointer to that RST entry.
;  6558          6652  2      !
;  6559          6653  2      IF .ROUT_INVOC_COUNT EQL 0 THEN RETURN .RSTPTR;
;  6560          6654  2      RETURN DBG$BUILD_INVOC_RST(.RSTPTR, .ROUT_INVOC_COUNT);
;  6561          6655  2
;  6562          6656  1      END;
```

```
                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

4C 4C 4F 46 5C 53 53 45 43 43 41 54 53 52 1C  00424 P.AED:  .ASCII  <28>\RSTACCESS\<92>\FOLLOW_STATIC_LINK\      ;
   4B 4E 49 4C 5F 43 49 54 41 54 53 5F 57 4F  00433                                                            ;

                                                        .PSECT  DBG$OWN,NOEXE,  PIC,2

                                                00054 SPVALUE:.BLKB   4


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                 0FFC 00000 FOLLOW_STATIC_LINK:
                                                        .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10,R11            ; 6204
                                     5E    FF00    CE  9E 00002                MOVAB   -256(SP), SP                ;
                                     58      04    AC  D0 00007                MOVL    RSTPTR, R8                  ; 6300
                                     06      14    A8  91 0000B                CMPB    20(R8), #6                  ;
                                                   10  12 0000F                BNEQ    1$                          ;
                                     50      08    AC  D0 00011                MOVL    SCOPE_RSTPTR, R0            ; 6307
                                                   56  13 00015                BEQL    8$                          ;
                                     02      14    A0  91 00017                CMPB    20(R0), #2                  ; 6308
                                                   09  13 0001B                BEQL    3$                          ;
                                     03      14    A0  91 0001D                CMPB    20(R0), #3                  ; 6309
                                                   03  13 00021 1$:            BEQL    3$                          ;
                                                 022B  31 00023 2$:            BRW     31$                         ;
                                     53            50  D0 00026 3$:            MOVL    R0, SCOPE                   ; 6316
                                           08      AE  D4 00029                CLRL    SCOPE_INVOC_NUM             ; 6317
                                  0D       15      A3  02 E1 0002C             BBC     #2, 2T(SCOPE), 4$           ; 6318
                                                   50  08 A3 D0 00031          MOVL    8(SCOPE), INVPTR            ; 6321
                                           08      AE  18 A0 D0 00035          MOVL    24(INVPTR), SCOPE_INVOC_NUM ; 6322
                                                   53  10 A0 D0 0003A          MOVL    16(INVPTR), SCOPE           ; 6323
                                     02            14  A3 91 0003E 4$:         CMPB    20(SCOPE), #2               ; 6330
                                                   0C  13 00042                BEQL    5$                          ;
                                     01            14  A3 91 00044             CMPB    20(SCOPE), #1               ; 6332
                                                   D9  13 00048                BEQL    2$                          ;
                                     53            10  A3 D0 0004A             MOVL    16(SCOPE), SCOPE            ; 6333
                                                   EE  11 0004E                BRB     4$                          ; 6330
                                     54                58 D0 00050 5$:         MOVL    R8, ROUTPTR                 ; 6341
                                     02            14  A4 91 00053 6$:         CMPB    20(ROUTPTR), #2             ; 6342
                                                   0C  13 00057                BEQL    7$                          ;
                                     01            14  A4 91 00059             CMPB    20(ROUTPTR), #1             ; 6344
                                                   C4  13 0005D                BEQL    2$                          ;
                                     54            10  A4 D0 0005F             MOVL    16(ROUTPTR), ROUTPTR        ; 6345
                                                   EE  11 00063                BRB     6$                          ; 6342
                                     53                54 D1 00065 7$:         CMPL    ROUTPTR, SCOPE              ; 6352
                                                   0B  12 00068                BNEQ    9$                          ;
                                           08      AE  D5 0006A                TSTL    SCOPE_INVOC_NUM             ; 6355
                                                   B4  13 0006D 8$:            BEQL    2$                          ;
                                           08      AE  DD 0006F                PUSHL   SCOPE_INVOC_NUM             ; 6356
                                                 01E3  31 00072                BRW     33$                         ;
                                     5A 00000000G      00 D0 00075 9$:         MOVL    DBG$RUNFRAME+64, PCVAL      ; 6369
                                  0C AE 00000000G      00 D0 0007C             MOVL    DBG$RUNFRAME+56, FRAMEPTR   ; 6370
                                     51 00000000G      00 9E 00084             MOVAB   DBG$RUNFRAME+4, CURRENT_REG ; 6371
                                  24 AE 00000000G      00 D0 0008B             MOVL    DBG$RUNFRAME, RUNFRAME_PTR  ; 6372
                                                        50 D4 00093             CLRL    I                           ; 6373
                                  BC AD40             6140 DE 00095 10$:        MOVAL   (CURRENT_REG)[I], REGVEC[I] ;
```

```
                F6              50              10  F3 0009B        AOBLEQ  #16, I, 10$                                     ;
                                    14      AE  D4 0009F        CLRL    ROUT_INVOC_COUNT                                ; 6380
                                            6E  7C 000A2        CLRQ    STATIC_LINK_FP                                  ; 6382
                                            5A  D5 000A4 11$:   TSTL    PCVAL                                           ; 6390
                                            0D  13 000A6        BEQL    12$                                             ;
                                50 00000000G    00  9E 000A8        MOVAB   DBG$FINAL_HANDL, R0                             ;
                                50          0C  BE  D1 000AF        CMPL    @FRAMEPTR, R0                                   ;
                                            29  12 000B3        BNEQ    13$                                             ;
                                    18      AE  9F 000B5 12$:   PUSHAB  PATHNAME                                        ; 6393
                                            58  DD 000B8        PUSHL   R8                                              ;
                        F1C6    CF              02  FB 000BA        CALLS   #2, DBG$STA_SYMPATHNAME                         ;
                                    1C      AE  9F 000BF        PUSHAB  PATHSTRING                                      ; 6394
                                    1C      AE  DD 000C2        PUSHL   PATHNAME                                        ;
                00000000G       00              02  FB 000C5        CALLS   #2, DBG$NPATHDESC_TO_CS                         ;
                                    1C      AE  DD 000CC        PUSHL   PATHSTRING                                      ; 6395
                                            01  DD 000CF        PUSHL   #1                                              ;
                                00028CB0        8F  DD 000D1        PUSHL   #167088                                         ;
                00000000G       00              03  FB 000D7        CALLS   #3, LIB$SIGNAL                                  ;
                            18  A3              5A  D1 000DE 13$:   CMPL    PCVAL, 24(SCOPE)                            ; 6404
                                            03  1E 000E2        BGEQU   15$                                             ;
                                        00FA    31  000E4 14$:   BRW     26$                                             ;
                            1C  A3              5A  D1 000E7 15$:   CMPL    PCVAL, 28(SCOPE)                            ; 6405
                                            F7  1A 000EB        BGTRU   14$                                             ;
                                59              01  D0 000ED        MOVL    #1, FRAME_FOUND_FLAG                        ; 6415
                                52          20  A3  D0 000F0        MOVL    32(SCOPE), SATPTR                           ; 6416
                                            1D  13 000F4        BEQL    17$                                             ; 6432
                                52              62  D0 000F6 16$:   MOVL    (SATPTR), SATPTR                            ; 6434
                                            18  13 000F9        BEQL    17$                                             ; 6438
                            04  A2              5A  D1 000FB        CMPL    PCVAL, 4(SATPTR)                            ; 6439
                                            12  1F 000FF        BLSSU   17$                                             ;
                                55          0C  A2  D0 00101        MOVL    12(SATPTR), RPTR                            ; 6440
                            08  A2              5A  D1 00105        CMPL    PCVAL, 8(SATPTR)                            ; 6441
                                            EB  1A 00109        BGTRU   16$                                             ;
                                02          14  A5  91 0010B        CMPB    20(RPTR), #2                                ; 6442
                                            E5  12 0010F        BNEQ    16$                                             ;
                                            59  D4 00111        CLRL    FRAME_FOUND_FLAG                            ; 6445
                                CE              59  E9 00113 17$:   BLBC    FRAME_FOUND_FLAG, 14$                       ; 6456
                            0C  AE              6E  D1 00116        CMPL    STATIC_LINK_FP, FRAMEPTR                    ; 6465
                                            0A  13 0011A        BEQL    18$                                             ;
                            08  AE          04  AE  D1 0011C        CMPL    SCOPE_INVOC_COUNT, SCOPE_INVOC_NUM          ; 6466
                                            03  13 00121        BEQL    18$                                             ;
                                        00B8    31  00123        BRW     25$                                             ;
                                54              53  D1 00126 18$:   CMPL    SCOPE, ROUTPTR                              ; 6476
                                            03  12 00129        BNEQ    19$                                             ;
                                        011E    31  0012B        BRW     30$                                             ;
                                        04  AE  D4 0012E 19$:   CLRL    SCOPE_INVOC_COUNT                           ; 6488
                                        24  A3  D5 00131        TSTL    36(SCOPE)                                   ; 6484
                                            08  12 00134        BNEQ    20$                                             ;
                            08  AE              01  D0 00136        MOVL    #1, SCOPE_INVOC_NUM                         ; 6487
                                            6E  D4 0013A        CLRL    STATIC_LINK_FP                              ; 6489
                                            79  11 0013C        BRB     24$                                             ; 6484
                                        08  AE  D4 0013E 20$:   CLRL    SCOPE_INVOC_NUM                             ; 6500
                        10  AE  00000000'       EF  D0 00141        MOVL    DBG$REG_SYMID, SAVEREGSYMID                 ; 6508
        00000000'       EF              58  D0 00149        MOVL    R8, DBG$REG_SYMID                               ; 6509
                                            50  D4 00150        CLRL    I                                               ; 6510
                                56 00000000G0040    DE 00152 21$:   MOVAL   DBG$REG_VECTOR[I], R6                       ; 6512
                        34 AE40             66  D0 0015A        MOVL    (R6), SAVEREGVEC[I]                             ;
```

```
                    51 00000000G0040  DE 0015F          MOVAL   DBG$REG_VALUES[I], R1                    ; 6513
                78 AE40        61     D0 00167          MOVL    (R1), SAVEREGVAL[I]
                    66     BC AD40    D0 0016C          MOVL    REGVEC[I], (R6)                          ; 6514
                    57     BC AD40    D0 00171          MOVL    REGVEC[I], REGPTR                        ; 6515
                              03      13 00176          BEQL    22$                                      ; 6516
                    61        67      D0 00178          MOVL    (REGPTR), (R1)
          D3        50        10      F3 0017B 22$:     AOBLEQ  #16, I, 21$                              ; 6510
                    5B    24  A3      D0 0017F          MOVL    36(SCOPE), DSTPTR                        ; 6523
                          20  AE      9F 00183          PUSHAB  VALKIND                                  ; 6524
                          2C  AE      9F 00186          PUSHAB  VALVECTOR
                          02  AB      9F 00189          PUSHAB  2(DSTPTR)
                F5FD      CF        03 FB 0018C          CALLS   #3, DBG$STA_VALSPEC
                    6E    28  AE      D0 00191          MOVL    VALVECTOR, STATIC_LINK_FP                ; 6526
    00000000'       EF    10  AE      D0 00195          MOVL    SAVEREGSYMID, DBG$REG_SYMID              ; 6531
                          50        D4 0019D          CLRL    I                                        ; 6532
    00000000G0040         34 AE40   D0 0019F 23$:     MOVL    SAVEREGVEC[I], DBG$REG_VECTOR[I]         ; 6534
    00000000G0040         78 AE40   D0 001A9          MOVL    SAVEREGVAL[I], DBG$REG_VALUES[I]         ; 6535
          E8        50        10      F3 001B3          AOBLEQ  #16, I, 23$                              ; 6532
                    53    10  A3      D0 001B7 24$:     MOVL    16(SCOPE), SCOPE                         ; 6545
                    02    14  A3      91 001BB          CMPB    20(SCOPE), #2                            ; 6546
                              1D      13 001BF          BEQL    25$                                      ;
                    01    14  A3      91 001C1          CMPB    20(SCOPE), #1                            ; 6548
                              F0      12 001C5          BNEQ    24$                                      ;
                       00000000'  EF    9F 001C7          PUSHAB  P.AED                                    ; 6550
                                  01    DD 001CD          PUSHL   #1                                       ;
                       00028362   8F    DD 001CF          PUSHL   #164706                                  ;
    00000000G          00        03     FB 001D5          CALLS   #3, LIB$SIGNAL                           ;
                              D9      11 001DC          BRB     24$                                      ; 6552
                          04  AE      D6 001DE 25$:     INCL    SCOPE_INVOC_COUNT                        ; 6561
                18    A4            5A  D1 001E1 26$:     CMPL    PCVAL, 24(ROUTPTR)                       ; 6573
                              32      1F 001E5          BLSSU   29$                                      ;
                1C    A4            5A  D1 001E7          CMPL    PCVAL, 28(ROUTPTR)                       ; 6574
                              2C      1A 001EB          BGTRU   29$                                      ;
                    59        01      D0 001ED          MOVL    #1, FRAME_FOUND_FLAG                     ; 6577
                    52    20  A4      D0 001F0          MOVL    32(ROUTPTR), SATPTR                      ; 6578
                              1D      13 001F4          BEQL    28$                                      ; 6594
                    52        62      D0 001F6 27$:     MOVL    (SATPTR), SATPTR                         ; 6596
                              18      13 001F9          BEQL    28$                                      ; 6600
                04    A2            5A  D1 001FB          CMPL    PCVAL, 4(SATPTR)                         ; 6601
                              12      1F 001FF          BLSSU   28$                                      ;
                    55    0C  A2      D0 00201          MOVL    12(SATPTR), RPTR                         ; 6602
                08    A2            5A  D1 00205          CMPL    PCVAL, 8(SATPTR)                         ; 6603
                              EB      1A 00209          BGTRU   27$                                      ;
                    02    14  A5      91 0020B          CMPB    20(RPTR), #2                             ; 6604
                              E5      12 0020F          BNEQ    27$                                      ;
                              59      D4 00211          CLRL    FRAME_FOUND_FLAG                         ; 6607
                    03        59      E9 00213 28$:     BLBC    FRAME_FOUND_FLAG, 29$                    ; 6614
                          14  AE      D6 00216          INCL    ROUT_INVOC_COUNT                         ; 6616
                          BC  AD      9F 00219 29$:     PUSHAB  REGVEC                                   ; 6625
                          28  AE      9F 0021C          PUSHAB  RUNFRAME_PTR
                          14  AE      DD 0021F          PUSHL   FRAMEPTR
              0000V       CF        03 FB 00222          CALLS   #3, GET_REGISTER_VALUES
                    57        F4      AD D0 00227          MOVL    REGVEC+56, REGPTR                        ; 6633
    00000000'       EF        67      D0 0022B          MOVL    (REGPTR), SPVALUE                        ; 6634
                F4  AD 00000000'  EF    9E 00232          MOVAB   SPVALUE, REGVEC+56                       ; 6635
                    57        F8      AD D0 0023A          MOVL    REGVEC+60, REGPTR                        ; 6641
                    5A        67      D0 0023E          MOVL    (REGPTR), PCVAL                          ; 6642
```

```
                57      F0    AD  D0 00241          MOVL    REGVEC+52, REGPTR                       ; 6643
             0C AE            67  D0 00245          MOVL    (REGPTR), FRAMEPTR                      ; 6644
                         FE58  31  00249          BRW     11$                                     ; 6383
                      14 AE    D5  0024C 30$:      TSTL    ROUT_INVOC_COUNT                        ; 6653
                         04    12  0024F          BNEQ    32$                                     ;
                50            58  D0 00251 31$:   MOVL    R8, R0                                  ;
                                  04  00254        RET                                             ;
                      14 AE    DD  00255 32$:      PUSHL   ROUT_INVOC_COUNT                        ; 6654
                         58    DD  00258 33$:      PUSHL   R8                                      ;
              D470      CF       02  FB 0025A      CALLS   #2, DBG$BUILD_INVOC_RST                 ;
                                  04  0025F        RET                                             ; 6656

; Routine Size:  608 bytes,    Routine Base:  DBG$CODE + 2A0A
```

```
;  6564     6657  1 ROUTINE GET_REGISTER_SYMID(PATHDESCR, SCOPEPTR, REG_LINE_LEX_PTR) =
;  6565     6658  1 !
;  6566     6659  1 ! FUNCTION
;  6567     6660  1 !       This routine determines whether a given input symbol is a register
;  6568     6661  1 !       name or not, and if so returns that register's SYMID.  The input
;  6569     6662  1 !       symbol is identified by a Pathname Descriptor from which the symbol
;  6570     6663  1 !       name is extracted.  If the symbol name is a register name (R0 - R11,
;  6571     6664  1 !       AP, FP, SP, PC, or PSL) with or without a leading percent-sign, a
;  6572     6665  1 !       a Data RST Entry and a DST record are created for the register.  The
;  6573     6666  1 !       data type is set to longword integer (DSC$K_DTYPE_L) in the DST record
;  6574     6667  1 !       and the name is set to the register name with a leading percent-sign
;  6575     6668  1 !       ("%R5" or "%SP", for example).
;  6576     6669  1 !
;  6577     6670  1 !       The RST entry's up-scope pointer is set as follows.  If the register is
;  6578     6671  1 !       located in a normal named scope (MOD\ROUT\%R5, for example), the regis-
;  6579     6672  1 !       ter RST entry's up-scope pointer is set to point to the RST entry for
;  6580     6673  1 !       that scope.  If the scope is a numeric scope (such as 0\%R5) which can
;  6581     6674  1 !       be converted to a named scope, the same thing is done.  However, if the
;  6582     6675  1 !       numeric scope cannot be converted to a named scope, meaning that no SET
;  6583     6676  1 !       module contains that scope, a dummy "numeric scope" Module RST Entry is
;  6584     6677  1 !       built to represent that scope.  This RST entry has the RST$V_MODNUMSCP
;  6585     6678  1 !       bit set which is later recognized by DBG$STA_SETCONTEXT as representing
;  6586     6679  1 !       an unnamed numeric scope.  The name of this "module" is set to be the
;  6587     6680  1 !       scope number in ASCII.  Finally, if the scope is the global scope (the
;  6588     6681  1 !       GST) or a named scope in a module which is not SET (or does not exist),
;  6589     6682  1 !       then the register RST entry is discarded and a zero SYMID is returned
;  6590     6683  1 !       (no such symbol).
;  6591     6684  1 !
;  6592     6685  1 !       The register RST entry and the numeric scope Module RST Entry (if any)
;  6593     6686  1 !       are both put on the Temporary RST Entry List.  The address of the regis-
;  6594     6687  1 !       ter RST entry is then returned as the register's SYMID.  If the input
;  6595     6688  1 !       symbol does not name a register or does not name a register in a SET
;  6596     6689  1 !       module, a zero is returned to indicate this.
;  6597     6690  1 !
;  6598     6691  1 ! INPUTS
;  6599     6692  1 !       PATHDESCR - A pointer to the Pathname Descriptor for the input symbol.
;  6600     6693  1 !                   This descriptor thus identifies the symbol to be checked for
;  6601     6694  1 !                   being a register name.
;  6602     6695  1 !
;  6603     6696  1 !       SCOPEPTR - A pointer to a Scope List Entry for the scope in which the
;  6604     6697  1 !                  register is located.  If there is no such scope, SCOPEPTR
;  6605     6698  1 !                  is zero.
;  6606     6699  1 !
;  6607     6700  1 !       REG_LINE_LEX_PTR - If there is a line number in the symbol pathname,
;  6608     6701  1 !                  this parameter gives the SYMID of the lexical entity named
;  6609     6702  1 !                  by that line number.  If there is no line number, this value
;  6610     6703  1 !                  is zero.
;  6611     6704  1 !
;  6612     6705  1 ! OUTPUTS
;  6613     6706  1 !       If the input symbol is a register name, an RST Entry is created for
;  6614     6707  1 !                  this register and its address is returned as the register's
;  6615     6708  1 !                  SYMID.  If the symbol is not a register, zero is returned.
;  6616     6709  1 !
;  6617     6710  1
;  6618     6711  2     BEGIN
;  6619     6712  2
;  6620     6713  2     MAP
```

```
;  6621     6714  2        PATHDESCR: REF PTH$PATHNAME,     ! Pointer to symbol Pathname Descriptor
;  6622     6715  2        SCOPEPTR: REF SCOPE$ENTRY;       ! Pointer to Scope List Entry
;  6623     6716  2
;  6624     6717  2    BIND
;  6625     6718  2        REGTBL = UPLIT ('R0  ', 'R1  ', 'R2  ', 'R3  ', ! Register name table
;  6626     6719  2                        'R4  ', 'R5  ', 'R6  ', 'R7  ',
;  6627     6720  2                        'R8  ', 'R9  ', 'R10 ', 'R11 ',
;  6628     6721  2                        'AP  ', 'FP  ', 'SP  ', 'PC  ',
;  6629     6722  2                        'PSL ', 'R12 ', 'R13 ', 'R14 ',
;  6630     6723  2                        'R15 '): VECTOR[,LONG];
;  6631     6724  2
;  6632     6725  2    LOCAL
;  6633     6726  2        DSTNAME: REF VECTOR[,BYTE],      ! Pointer to DST record name field
;  6634     6727  2        DSTPTR: REF DST$RECORD,          ! Pointer to created register DST record
;  6635     6728  2        LENGTH,                          ! The byte length of the symbol name
;  6636     6729  2        MODPTR: REF RST$ENTRY,           ! Pointer to Module RST Entry or to
;  6637     6730  2                                         !     "numeric scope" Module RST Entry
;  6638     6731  2        NAMEPTR: REF VECTOR[,BYTE],      ! Pointer to the symbol's name string
;  6639     6732  2        NEWVALUE,                        ! Temporary in decimal conversion
;  6640     6733  2        NUMNAME: VECTOR[12, BYTE],       ! Numeric scope name in Counted ASCII
;  6641     6734  2        NUMTEMP: VECTOR[12, BYTE],       ! Temporary used to compute NUMNAME
;  6642     6735  2        NUMSCP_INVOC_NUM,                ! The invocation number associated with
;  6643     6736  2                                         !     a named numeric scope
;  6644     6737  2        PATHSTRING,                      ! Pointer to pathname Counted ASCII
;  6645     6738  2        PATHVEC: REF VECTOR[,LONG],      ! Pointer to pathname vector
;  6646     6739  2        PNAME: REF VECTOR[,BYTE],        ! Pointer to Counted ASCII string
;  6647     6740  2        REGNUM,                          ! The register number of the register
;  6648     6741  2        RNAME: REF VECTOR[,BYTE],        ! Pointer to Counted ASCII string
;  6649     6742  2        RPTR: REF RST$ENTRY,             ! Temporary RST entry pointer
;  6650     6743  2        RSTPTR: REF RST$ENTRY,           ! Pointer to created register RST entry
;  6651     6744  2        SCOPE: REF RST$ENTRY,            ! Pointer to RST entry for named scope
;  6652     6745  2                                         !     corresponding to a numeric scope
;  6653     6746  2        SCOPENTRY: SCOPE$ENTRY,          ! Local copy of input Scope List Entry
;  6654     6747  2        TEMPNAME: VECTOR[4, BYTE],       ! Upcased copy of symbol name
;  6655     6748  2        VALUE;                           ! The numeric scope number--used to con-
;  6656     6749  2                                         !     vert that number to decimal ASCII
;  6657     6750  2
;  6658     6751  2
;  6659     6752  2
;  6660     6753  2    ! Check that this Pathname Descriptor describes a symbol name without data
;  6661     6754  2    ! qualification and that the symbol contains at least two characters (such
;  6662     6755  2    ! as "R5") and at most four characters (such as "%R11").  If not, this is
;  6663     6756  2    ! not a register reference and we return zero.
;  6664     6757  2    !
;  6665     6758  2    IF .PATHDESCR[PTH$B_PATHCNT] NEQ .PATHDESCR[PTH$B_TOTCNT] THEN RETURN 0;
;  6666     6759  2    PATHVEC = PATHDESCR[PTH$A_PATHVECTOR];
;  6667     6760  2    NAMEPTR = .PATHVEC[.PATHDESCR[PTH$B_PATHCNT] - 1];
;  6668     6761  2    LENGTH = .NAMEPTR[0];
;  6669     6762  2    IF .LENGTH LSS 2 OR .LENGTH GTR 4 THEN RETURN 0;
;  6670     6763  2    NAMEPTR = NAMEPTR[1];
;  6671     6764  2
;  6672     6765  2
;  6673     6766  2    ! If the symbol contains a leading percent-sign (as in "%R5"), strip it off.
;  6674     6767  2    !
;  6675     6768  2    IF .NAMEPTR[0] EQL '%'
;  6676     6769  2    THEN
;  6677     6770  3        BEGIN
```

```
;  6678     6771  3          NAMEPTR = .NAMEPTR + 1;
;  6679     6772  3          LENGTH = .LENGTH - 1;
;  6680     6773  2          END;
;  6681     6774  2
;  6682     6775  2
;  6683     6776  2      ! Copy the symbol name to a temporary buffer.  The temporary copy is
;  6684     6777  2      ! upcased so that register names are recognized regardless of case.
;  6685     6778  2      ! This is mainly important for language C.
;  6686     6779  2      !
;  6687     6780  2      INCR I FROM 0 TO .LENGTH - 1 DO
;  6688     6781  3          BEGIN
;  6689     6782  3          TEMPNAME[.I] = .NAMEPTR[.I];
;  6690     6783  4          IF (.TEMPNAME[.I] GEQ 'a') AND (.TEMPNAME[.I] LEQ 'z')
;  6691     6784  3          THEN
;  6692     6785  3              TEMPNAME[.I] = .TEMPNAME[.I] - 'a' + 'A';
;  6693     6786  3
;  6694     6787  2          END;
;  6695     6788  2
;  6696     6789  2
;  6697     6790  2      ! Loop through the list of valid register names to see if this symbol's
;  6698     6791  2      ! name is a register name.
;  6699     6792  2      !
;  6700     6793  2      REGNUM = -1;
;  6701     6794  2      INCR I FROM 0 TO 20 DO
;  6702     6795  3          BEGIN
;  6703     6796  3          IF CH$EQL(.LENGTH, TEMPNAME, 3, REGTBL[.I], ' ')
;  6704     6797  3          THEN
;  6705     6798  4              BEGIN
;  6706     6799  4              REGNUM = .I;
;  6707     6800  4              EXITLOOP;
;  6708     6801  3              END;
;  6709     6802  3
;  6710     6803  2          END;
;  6711     6804  2
;  6712     6805  2
;  6713     6806  2      ! If the symbol name was not a register name, return zero--not a register.
;  6714     6807  2      !
;  6715     6808  2      IF .REGNUM LSS 0 THEN RETURN 0;
;  6716     6809  2
;  6717     6810  2
;  6718     6811  2      ! It is a register name.  If REGNUM is larger than 16, the user requested
;  6719     6812  2      ! R12, R13, R14, or R15, so we reset REGNUM to point to AP, FP, SP, or PC.
;  6720     6813  2      !
;  6721     6814  2      IF .REGNUM GTR 16 THEN REGNUM = .REGNUM - 5;
;  6722     6815  2
;  6723     6816  2
;  6724     6817  2      ! Create a Data RST Entry for the register.
;  6725     6818  2      !
;  6726     6819  2      RSTPTR = DBG$GET_MEMORY(RST$K_DATENTSIZ + (11 + %UPVAL)/%UPVAL);
;  6727     6820  2      DSTPTR = .RSTPTR + RST$K_DATENTSIZ*%UPVAL;
;  6728     6821  2      RSTPTR[RST$L_DSTPTR] = .DSTPTR;
;  6729     6822  2      RSTPTR[RST$B_KIND] = RST$K_DATA;
;  6730     6823  2      RSTPTR[RST$V_NONZLENGTH] = TRUE;
;  6731     6824  2      RSTPTR[RST$V_REGISTER] = TRUE;
;  6732     6825  2
;  6733     6826  2
;  6734     6827  2      ! Also create a DST record for the register.  This DST record makes
```

```
;  6735     6828  2      ! the data type longword integer and contains the register name
;  6736     6829  2      ! preceded by a percent-sign (e.g., "%R5").
;  6737     6830  2      !
;  6738     6831  2      DSTPTR[DST$B_LENGTH] = 8 + .LENGTH;
;  6739     6832  2      DSTPTR[DST$B_TYPE] = DSC$K_DTYPE_L;
;  6740     6833  2      DSTPTR[DST$V_VALKIND] = DST$K_VALKIND_REG;
;  6741     6834  2      DSTPTR[DST$L_VALUE] = .REGNUM;
;  6742     6835  2      DSTPTR[DST$B_NAME] = .LENGTH + 1;
;  6743     6836  2      DSTNAME = DSTPTR[DST$B_NAME];
;  6744     6837  2      DSTNAME[1] = '%';
;  6745     6838  2      CH$MOVE(.LENGTH, REGTBL[.REGNUM], DSTNAME[2]);
;  6746     6839  2
;  6747     6840  2
;  6748     6841  2      ! Link the new RST entry into the Temporary RST Entry List.
;  6749     6842  2      !
;  6750     6843  2      RSTPTR[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  6751     6844  2      RST$TEMP_LIST = .RSTPTR;
;  6752     6845  2
;  6753     6846  2
;  6754     6847  2      ! Make a local copy of the Scope List Entry.  Then see if the scope is a
;  6755     6848  2      ! module scope (as opposed to a routine scope) and is not explicitly speci-
;  6756     6849  2      ! fied as a pathname; this will commonly be the case in language MACRO.
;  6757     6850  2      ! If so, we change the scope to numeric scope 0 by modifying the local
;  6758     6851  2      ! Scope List Entry.  This causes the the current value of the specified
;  6759     6852  2      ! register to be shown.
;  6760     6853  2      !
;  6761     6854  2      IF .SCOPEPTR EQL 0 THEN RETURN 0;
;  6762     6855  2      CH$MOVE(SCOPE$K_ENTSIZE*%UPVAL, .SCOPEPTR, SCOPENTRY);
;  6763     6856  2      IF (.SCOPENTRY[SCOPE$L_STATE] EQL SCOPE$K_NORMAL) AND
;  6764     6857  3         (.PATHDESCR[PTH$B_TOTCNT] EQL 1)
;  6765     6858  2      THEN
;  6766     6859  3          BEGIN
;  6767     6860  3          RPTR = .SCOPENTRY[SCOPE$L_RSTPTR];
;  6768     6861  3          WHILE .RPTR[RST$B_KIND] NEQ RST$K_ROUTINE DO
;  6769     6862  4              BEGIN
;  6770     6863  4              IF .RPTR[RST$B_KIND] EQL RST$K_MODULE
;  6771     6864  4              THEN
;  6772     6865  5                  BEGIN
;  6773     6866  5                  SCOPENTRY[SCOPE$L_STATE] = SCOPE$K_NUMBERED;
;  6774     6867  5                  SCOPENTRY[SCOPE$L_MODPTR] = 0;
;  6775     6868  5                  EXITLOOP;
;  6776     6869  4                  END;
;  6777     6870  4
;  6778     6871  4              RPTR = .RPTR[RST$L_UPSCOPEPTR];
;  6779     6872  3              END;
;  6780     6873  3
;  6781     6874  2          END;
;  6782     6875  2
;  6783     6876  2
;  6784     6877  2      ! Similarly, if the scope is the Global Scope (the GST) and is not expli-
;  6785     6878  2      ! citly specified as a pathname, we change the scope to numeric scope 0.
;  6786     6879  2      ! This situation is not particularly common, but most likely the user wants
;  6787     6880  2      ! the current register value in this situation.
;  6788     6881  2      !
;  6789     6882  2      IF (.SCOPENTRY[SCOPE$L_STATE] EQL SCOPE$K_GLOBAL) AND
;  6790     6883  3         (.PATHDESCR[PTH$B_TOTCNT] EQL 1)
;  6791     6884  2      THEN
```

```
;  6792     6885  3          BEGIN
;  6793     6886  3          SCOPENTRY[SCOPE$L_STATE] = SCOPE$K_NUMBERED;
;  6794     6887  3          SCOPENTRY[SCOPE$L_MODPTR] = 0;
;  6795     6888  2          END;
;  6796     6889  2
;  6797     6890  2
;  6798     6891  2      ! Now determine what scope this register RST entry should be put in.  This
;  6799     6892  2      ! is determined by the kind of the local Scope List Entry.
;  6800     6893  2      !
;  6801     6894  2      CASE .SCOPENTRY[SCOPE$L_STATE] FROM SCOPE$K_NORMAL TO SCOPE$K_SETMODS OF
;  6802     6895  2          SET
;  6803     6896  2
;  6804     6897  2
;  6805     6898  2          ! Handle normal named scopes.  If the scope's module is not set, we
;  6806     6899  2          ! return zero (no such register).  Otherwise, we have a good scope and
;  6807     6900  2          ! simply put this scope up-scope from the register RST entry.  We then
;  6808     6901  2          ! return the address of the register RST entry as the register SYMID
;  6809     6902  2          ! unless a line number appeared in the pathname.
;  6810     6903  2          !
;  6811     6904  2          [SCOPE$K_NORMAL]:
;  6812     6905  3              BEGIN
;  6813     6906  3              MODPTR = .SCOPENTRY[SCOPE$L_MODPTR];
;  6814     6907  3              IF NOT .MODPTR[RST$V_MODSET] THEN RETURN 0;
;  6815     6908  3              RSTPTR[RST$L_UPSCOPEPTR] = .SCOPENTRY[SCOPE$L_RSTPTR];
;  6816     6909  3
;  6817     6910  3
;  6818     6911  3              ! If there is a line number in the pathname, then the line number
;  6819     6912  3              ! refers to the lexical entity pointed to by REG_LINE_LEX_PTR.  In
;  6820     6913  3              ! this case we make sure the scope we have contains that entity;
;  6821     6914  3              ! otherwise the pathname is in error and we return 0.  If the
;  6822     6915  3              ! pathname is okay, we attach the register SYMID to the lexical
;  6823     6916  3              ! entity specified by the line number.
;  6824     6917  3              !
;  6825     6918  3              IF .REG_LINE_LEX_PTR NEQ 0
;  6826     6919  3              THEN
;  6827     6920  4                  BEGIN
;  6828     6921  4                  RPTR = .REG_LINE_LEX_PTR;
;  6829     6922  4                  WHILE TRUE DO
;  6830     6923  5                      BEGIN
;  6831     6924  5                      IF .RPTR[RST$B_KIND] EQL RST$K_MODULE THEN RETURN 0;
;  6832     6925  5                      IF .RPTR EQL .RSTPTR[RST$L_UPSCOPEPTR]
;  6833     6926  5                      THEN
;  6834     6927  6                          BEGIN
;  6835     6928  6                          RSTPTR[RST$L_UPSCOPEPTR] = .REG_LINE_LEX_PTR;
;  6836     6929  6                          EXITLOOP;
;  6837     6930  5                          END;
;  6838     6931  5
;  6839     6932  5                      RPTR = .RPTR[RST$L_UPSCOPEPTR];
;  6840     6933  4                      END;
;  6841     6934  4
;  6842     6935  3                  END;
;  6843     6936  3
;  6844     6937  3
;  6845     6938  3              ! Unless there was an invocation number in the pathname, return the
;  6846     6939  3              ! register SYMID now.
;  6847     6940  3              !
;  6848     6941  3              IF .PATHDESCR[PTH$B_LOCINVOC] EQL 0 THEN RETURN .RSTPTR;
```

```
;  6849     6942  3
;  6850     6943  3
;  6851     6944  3
;  6852     6945  3
;  6853     6946  3
;  6854     6947  3
;  6855     6948  3
;  6856     6949  3
;  6857     6950  4
;  6858     6951  4
;  6859     6952  4
;  6860     6953  5
;  6861     6954  5
;  6862     6955  5
;  6863     6956  4
;  6864     6957  4
;  6865     6958  4
;  6866     6959  3
;  6867     6960  3
;  6868     6961  3
;  6869     6962  3
;  6870     6963  3
;  6871     6964  3
;  6872     6965  3
;  6873     6966  3
;  6874     6967  3
;  6875     6968  3
;  6876     6969  4
;  6877     6970  4
;  6878     6971  4
;  6879     6972  4
;  6880     6973  4
;  6881     6974  4
;  6882     6975  3
;  6883     6976  3
;  6884     6977  3
;  6885     6978  3
;  6886     6979  3
;  6887     6980  3
;  6888     6981  3
;  6889     6982  3
;  6890     6983  3
;  6891     6984  3
;  6892     6985  3
;  6893     6986  3
;  6894     6987  3
;  6895     6988  3
;  6896     6989  3
;  6897     6990  3
;  6898     6991  3
;  6899     6992  3
;  6900     6993  3
;  6901     6994  3
;  6902     6995  3
;  6903     6996  3
;  6904     6997  3
;  6905     6998  3
```

```
        ! There is an invocation number.  Find the inner-most routine con-
        ! taining the declaration of this symbol.  This is the routine to
        ! which the invocation number must apply.
        !
        RPTR = .RSTPTR;
        WHILE .RPTR[RST$B_KIND] NEQ RST$K_ROUTINE DO
            BEGIN
            IF .RPTR[RST$B_KIND] EQL RST$K_MODULE
            THEN
                BEGIN
                DBG$NPATHDESC_TO_CS(.PATHDESCR, PATHSTRING);
                SIGNAL(DBG$_MISINVNUM, 1, .PATHSTRING);
                END;

            RPTR = .RPTR[RST$L_UPSCOPEPTR];
            END;


        ! Now make sure the invocation number was indeed appended to that
        ! routine name in the pathname.
        !
        PNAME = .PATHVEC[.PATHDESCR[PTH$B_LOCINVOC] - 1];
        RNAME = DBG$GET_DST_NAME(.RPTR[RST$L_DSTPTR]);
        IF CH$NEQ(.PNAME[0], PNAME[1], .RNAME[0], RNAME[1], 0)
        THEN
            BEGIN
            DBG$NPATHDESC_TO_CS(.PATHDESCR, PATHSTRING);
            SIGNAL(DBG$_MISINVNUM, 1, .PATHSTRING);
            END;


        ! All looks good.  Create the Invocation Number RST Entry along
        ! with a new copy of the symbol's RST entry if the number is
        ! non-zero.
        !
        IF .PATHDESCR[PTH$L_INVOCNUM] NEQ 0
        THEN
            RSTPTR = DBG$BUILD_INVOC_RST(.RSTPTR, .PATHDESCR[PTH$L_INVOCNUM]);

        RETURN .RSTPTR;

        END;                            ! End of Normal scope code


    ! Handle numeric scopes.  (A "numeric scope" is the scope a specified
    ! number of call frames down in the VAX call stack; 2\%R5, for example,
    ! refers to %R5 in the call frame two levels down in the stack.)  Here
    ! we do one of two things: if we can find a named scope in a SET module
    ! corresponding to the given numeric scope, we attach the register RST
    ! entry to that scope; and if we cannot, we create a special "numeric
    ! scope" Module RST Entry to represent the unnamed numeric scope.  In
    ! either case, we return a non-zero register SYMID.
    !
    [SCOPE$K_NUMBERED]:
        BEGIN
```

```
;  6906     6999  3
;  6907     7000
;  6908     7001                ! See if we can convert this numeric scope to a regular named scope
;  6909     7002                ! with a normal RST entry.  If so, we put that scope RST entry up-
;  6910     7003                ! scope from the register RST entry and return the register SYMID.
;  6911     7004                ! (Note that we build an Invocation Number RST Entry if necessary.)
;  6912     7005                !
;  6913     7006                DBG$STA_NUMBERED_SCOPE(.SCOPENTRY[SCOPE$L_MODPTR],
;  6914     7007                                       MODPTR, SCOPE, NUMSCP_INVOC_NUM);
;  6915     7008                IF .SCOPE NEQ 0
;  6916     7009                THEN
;  6917     7010  4                 BEGIN
;  6918     7011  4                 RSTPTR[RST$L_UPSCOPEPTR] = .SCOPE;
;  6919     7012  4                 IF .NUMSCP_INVOC_NUM NEQ 0
;  6920     7013  4                 THEN
;  6921     7014  4                     RSTPTR = DBG$BUILD_INVOC_RST(.RSTPTR, .NUMSCP_INVOC_NUM);
;  6922     7015  4
;  6923     7016  4                 RETURN .RSTPTR;
;  6924     7017  3                 END;
;  6925     7018
;  6926     7019
;  6927     7020                ! We have a numeric scope, but it does not correspond to any RST
;  6928     7021                ! entry in any SET module.  We therefore create a "numeric scope"
;  6929     7022                ! Module RST Entry to represent the numeric scope.  This entry has
;  6930     7023                ! the RST$V_MODNUMSCP bit set and will therefore be recognized as
;  6931     7024                ! representing a numbered stack frame by DBG$STA_SETCONTEXT.
;  6932     7025                !
;  6933     7026                ! First generate the name of this pseudo-module, namely the scope
;  6934     7027                ! number in Counted ASCII.  We get the scope number from the Scope
;  6935     7028                ! List Entry.
;  6936     7029                !
;  6937     7030                VALUE = .SCOPENTRY[SCOPE$L_MODPTR];
;  6938     7031                LENGTH = 0;
;  6939     7032                WHILE TRUE DO
;  6940     7033  4                 BEGIN
;  6941     7034  4                 NEWVALUE = .VALUE/10;
;  6942     7035  4                 NUMTEMP[.LENGTH] = .VALUE - .NEWVALUE*10 + '0';
;  6943     7036  4                 LENGTH = .LENGTH + 1;
;  6944     7037  4                 IF .NEWVALUE EQL 0 THEN EXITLOOP;
;  6945     7038  4                 VALUE = .NEWVALUE;
;  6946     7039  4                 END;
;  6947     7040
;  6948     7041                NUMTEMP[.LENGTH] = .LENGTH;
;  6949     7042                INCR I FROM 0 TO .LENGTH DO
;  6950     7043                    NUMNAME[.I] = .NUMTEMP[.LENGTH - .I];
;  6951     7044
;  6952     7045
;  6953     7046                ! Now allocate space for this "module" RST entry and the associated
;  6954     7047                ! Module Begin and Module End DST entries.  Then fill in the "nume-
;  6955     7048                ! ric scope" Module RST Entry, including the RST$V_MODNUMSCP flag.
;  6956     7049                !
;  6957     7050  4             MODPTR = DBG$GET_MEMORY(RST$K_MODENTSIZ + (DST$K_MODBEG_SIZE
;  6958     7051  4                         + .LENGTH + DST$K_MODEND_SIZE + %UPVAL - 1)7%UPVAL);
;  6959     7052                DSTPTR = .MODPTR + RST$K_MODENTSIZ*%UPVAL;
;  6960     7053                MODPTR[RST$L_DSTPTR] = .DSTPTR;
;  6961     7054                MODPTR[RST$B_KIND] = RST$K_MODULE;
;  6962     7055  3             MODPTR[RST$B_LANGUAGE] = .DBG$GB_LANGUAGE;
```

```
;  6963          7056  3          MODPTR[RST$L_MODSCPNUM] = .SCOPENTRY[SCOPE$L_MODPTR];
;  6964          7057  3          MODPTR[RST$V_MODNUMSCP] = TRUE;
;  6965          7058  3          MODPTR[RST$V_MODSET] = TRUE;
;  6966          7059  3          MODPTR[RST$V_MOD_IN_RST] = TRUE;
;  6967          7060  3
;  6968          7061  3
;  6969          7062  3          ! Also fill in the dummy module's Module Begin and End DST records.
;  6970          7063  3          !
;  6971          7064  3          DSTPTR[DST$B_LENGTH] = DST$K_MODBEG_SIZE - 1 + .LENGTH;
;  6972          7065  3          DSTPTR[DST$B_TYPE] = DST$K_MODBEG;
;  6973          7066  3          DSTPTR[DST$L_MODBEG_LANGUAGE] = .MODPTR[RST$B_LANGUAGE];
;  6974          7067  3          CH$MOVE(.LENGTH + 1, NUMNAME[0], DSTPTR[DST$B_MODBEG_NAME]);
;  6975          7068  3          DSTPTR = .DSTPTR + DST$K_MODBEG_SIZE + .LENGTH;
;  6976          7069  3          DSTPTR[DST$B_LENGTH] = DST$K_MODEND_SIZE - 1;
;  6977          7070  3          DSTPTR[DST$B_TYPE] = DST$K_MODEND;
;  6978          7071  3
;  6979          7072  3
;  6980          7073  3          ! Put the dummy Module RST Entry on the Temporary RST Entry List.
;  6981          7074  3          ! Also put it up-scope from the register RST entry.  Then return
;  6982          7075  3          ! the address of the register RST entry as the register SYMID.
;  6983          7076  3          !
;  6984          7077  3          MODPTR[RST$L_HASH_FLINK] = .RST$TEMP_LIST;
;  6985          7078  3          RST$TEMP_LIST = .MODPTR;
;  6986          7079  3          RSTPTR[RST$L_UPSCOPEPTR] = .MODPTR;
;  6987          7080  3          RETURN .RSTPTR;
;  6988          7081  2          END;
;  6989          7082  2
;  6990          7083  2
;  6991          7084  2      ! Any other scope (such as the global scope) cannot contain a register,
;  6992          7085  2      ! so we return zero to indicate that this is not a register.
;  6993          7086  2      !
;  6994          7087  2      [INRANGE, OUTRANGE]:
;  6995          7088  2          RETURN 0;
;  6996          7089  2
;  6997          7090  2      TES;
;  6998          7091  2
;  6999          7092  1  END;


                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                                        00441           .BLKB   3
                20  20  30  52  00444 P.AEE:   .ASCII  \R0  \                                ;
                20  20  31  52  00448           .ASCII  \R1  \                                ;
                20  20  32  52  0044C           .ASCII  \R2  \                                ;
                20  20  33  52  00450           .ASCII  \R3  \                                ;
                20  20  34  52  00454           .ASCII  \R4  \                                ;
                20  20  35  52  00458           .ASCII  \R5  \                                ;
                20  20  36  52  0045C           .ASCII  \R6  \                                ;
                20  20  37  52  00460           .ASCII  \R7  \                                ;
                20  20  38  52  00464           .ASCII  \R8  \                                ;
                20  20  39  52  00468           .ASCII  \R9  \                                ;
                20  30  31  52  0046C           .ASCII  \R10 \                                ;
                20  31  31  52  00470           .ASCII  \R11 \                                ;
                20  20  50  41  00474           .ASCII  \AP  \                                ;
                20  20  50  46  00478           .ASCII  \FP  \                                ;
```

```
                20  20  50  53  0047C          .ASCII  \SP  \                                          ;
                20  20  43  50  00480          .ASCII  \PC  \                                          ;
                20  4C  53  50  00484          .ASCII  \PSL \                                          ;
                20  32  31  52  00488          .ASCII  \R12 \                                          ;
                20  33  31  52  0048C          .ASCII  \R13 \                                          ;
                20  34  31  52  00490          .ASCII  \R14 \                                          ;
                20  35  31  52  00494          .ASCII  \R15 \                                          ;

                                        REGTBL=             P.AEE

                                               .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                    0FFC 00000 GET_REGISTER_SYMID:
                                               .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10,R11        ; 6657
5B 00000000G     00    9E 00002               MOVAB   RST$TEMP_LIST, R11                          ;
5E                3C    C2 00009               SUBL2   #60, SP                                     ;
5A          04    AC    D0 0000C               MOVL    PATHDESCR, R10                              ; 6758
6A          01    AA    91 00010               CMPB    1(R10), (R10)                               ;
                  03    13 00014               BEQL    2$                                          ;
                0297    31 00016 1$:           BRW     34$                                         ;
57          08    AA    9E 00019 2$:           MOVAB   8(R10), PATHVEC                             ; 6759
50          01    AA    9A 0001D               MOVZBL  1(R10), R0                                  ; 6760
51          FC  A740    D0 00021               MOVL    -4(PATHVEC)[R0], NAMEPTR                    ;
56                61    9A 00026               MOVZBL  (NAMEPTR), LENGTH                           ; 6761
02                56    D1 00029               CMPL    LENGTH, #2                                  ; 6762
                  E8    19 0002C               BLSS    1$                                          ;
04                56    D1 0002E               CMPL    LENGTH, #4                                  ;
                  E3    14 00031               BGTR    1$                                          ;
                  51    D6 00033               INCL    NAMEPTR                                     ; 6763
                  25    61 91 00035            CMPB    (NAMEPTR), #37                              ; 6768
                        04 12 00038            BNEQ    3$                                          ;
                        51 D6 0003A            INCL    NAMEPTR                                     ; 6771
                        56 D7 0003C            DECL    LENGTH                                      ; 6772
                  50    01 CE 0003E 3$:        MNEGL   #1, I                                       ; 6782
                        17 11 00041            BRB     5$                                          ;
          52        50    5E C1 00043 4$:        ADDL3   SP, I, R2                                   ;
                    62  6041 90 00047            MOVB    (I)[NAMEPTR], (R2)                          ;
                61  8F    62 91 0004B            CMPB    (R2), #97                                   ; 6783
                        09 1F 0004F            BLSSU   5$                                          ;
                7A  8F    62 91 00051            CMPB    (R2), #122                                  ;
                        03 1A 00055            BGTRU   5$                                          ;
                  62    20 82 00057            SUBB2   #32, (R2)                                   ; 6785
          E5        50    56 F2 0005A 5$:        AOBLSS  LENGTH, I, 4$                               ; 6780
                  55    01 CE 0005E            MNEGL   #1, REGNUM                                  ; 6793
                        54 D4 00061            CLRL    I                                           ; 6794
                00000000'EF44 DF 00063 6$:     PUSHAL  REGTBL[I]                                   ; 6796
03        20    04    AE    56 2D 0006A            CMPC5   LENGTH, TEMPNAME, #32, #3, @(SP)+           ;
                        9E 00070               BNEQ    7$                                          ;
                        05 12 00071            MOVL    I, REGNUM                                   ; 6799
                  55    54 D0 00073            BRB     8$                                          ; 6798
                        04 11 00076            AOBLEQ  #20, I, 6$                                  ; 6794
          E7        54    14 F3 00078 7$:        TSTL    REGNUM                                      ; 6808
                        55 D5 0007C 8$:        BLSS    1$                                          ;
                        96 19 0007E            CMPL    REGNUM, #16                                 ; 6814
                  10    55 D1 00080            BLEQ    9$                                          ;
                        03 15 00083            ;
```

```
                                55              05   C2 00085          SUBL2   #5, REGNUM                                      ;
                                                0A   DD 00088 9$:      PUSHL   #10                                             ; 6819
                00000000G       00              01   FB 0008A          CALLS   #1, DBG$GET_MEMORY
                                59              50   D0 00091          MOVL    R0, RSTPTR                                      ;
                                58        1C    A9   9E 00094          MOVAB   28(R9), DSTPTR                                  ; 6820
                          0C    A9              58   D0 00098          MOVL    DSTPTR, 12(RSTPTR)                              ; 6821
                          14    A9              06   90 0009C          MOVB    #6, 20(RSTPTR)                                  ; 6822
                          15    A9        42    8F   88 000A0          BISB2   #66, 21(RSTPTR)                                 ; 6824
                    68            56          08   81 000A5          ADDB3   #8, LENGTH, (DSTPTR)                            ; 6831
                          01    A8              08   90 000A9          MOVB    #8, 1(DSTPTR)                                   ; 6832
                          02    A8              03   88 000AD          BISB2   #3, 2(DSTPTR)                                   ; 6833
                          03    A8              55   D0 000B1          MOVL    REGNUM, 3(DSTPTR)                               ; 6834
                07    A8              56          01   81 000B5          ADDB3   #1, LENGTH, 7(DSTPTR)                           ; 6835
                                50        07    A8   9E 000BA          MOVAB   7(DSTPTR), DSTNAME                              ; 6836
                          01    A0              25   90 000BE          MOVB    #37, 1(DSTNAME)                                 ; 6837
                                00000000'EF     45   DF 000C2          PUSHAL  REGTBL[REGNUM]                                  ; 6838
                02    A0        9E              56   28 000C9          MOVC3   LENGTH, @(SP)+, 2(DSTNAME)                      ;
                                69              6B   D0 000CE          MOVL    RST$TEMP_LIST, (RSTPTR)                         ; 6843
                                6B              59   D0 000D1          MOVL    RSTPTR, RST$TEMP_LIST                           ; 6844
                                          08    AC   D5 000D4          TSTL    SCOPEPTR                                        ; 6854
                                                4F   13 000D7          BEQL    15$                                             ;
                14    AE        08      BC            10   28 000D9          MOVC3   #16, @SCOPEPTR, SCOPENTRY                       ; 6855
                                01              18   AE   D1 000DF          CMPL    SCOPENTRY+4, #1                                 ; 6856
                                                24   12 000E3          BNEQ    12$                                             ;
                                01              6A   91 000E5          CMPB    (R10), #1                                       ; 6857
                                                1F   12 000E8          BNEQ    12$                                             ;
                                52        1C    AE   D0 000EA          MOVL    SCOPENTRY+8, RPTR                               ; 6860
                                02        14    A2   91 000EE 10$:     CMPB    20(RPTR), #2                                    ; 6861
                                                15   13 000F2          BEQL    12$                                             ;
                                01        14    A2   91 000F4          CMPB    20(RPTR), #1                                    ; 6863
                                                09   12 000F8          BNEQ    11$                                             ;
                          18    AE              02   D0 000FA          MOVL    #2, SCOPENTRY+4                                 ; 6866
                                          20    AE   D4 000FE          CLRL    SCOPENTRY+12                                    ; 6867
                                                06   11 00101          BRB     12$                                             ; 6865
                                52        10    A2   D0 00103 11$:     MOVL    16(RPTR), RPTR                                  ; 6871
                                                E5   11 00107          BRB     10$                                             ; 6861
                                03        18    AE   D1 00109 12$:     CMPL    SCOPENTRY+4, #3                                 ; 6882
                                                0C   12 0010D          BNEQ    13$                                             ;
                                01              6A   91 0010F          CMPB    (R10), #1                                       ; 6883
                                                07   12 00112          BNEQ    13$                                             ;
                          18    AE              02   D0 00114          MOVL    #2, SCOPENTRY+4                                 ; 6886
                                          20    AE   D4 00118          CLRL    SCOPENTRY+12                                    ; 6887
                    03                  01    18   AE   CF 0011B 13$:     CASEL   SCOPENTRY+4, #1, #3                             ; 6998
0195            0195                    00CC                000B       00120 14$:     .WORD   16$-14$,-
                                                                                              27$-14$,-
                                                                                              34$-14$,-
                                                                                              34$-14$
                                                                    018A   31 00128 15$:     BRW     34$                             ; 7088
                          10    AE        20    AE   D0 0012B 16$:     MOVL    SCOPENTRY+12, MODPTR                            ; 6906
                                50        10    AE   D0 00130          MOVL    MODPTR, R0                                      ; 6907
                                F0        28    A0   E9 00134          BLBC    40(R0), 15$                                     ;
                          10    A9        1C    AE   D0 00138          MOVL    SCOPENTRY+8, 16(RSTPTR)                         ; 6908
                                50        0C    AC   D0 0013D          MOVL    REG_LINE_LEX_PTR, R0                            ; 6918
                                                1B   13 00141          BEQL    19$                                             ;
                                52              50   D0 00143          MOVL    R0, RPTR                                        ; 6921
                                01        14    A2   91 00146 17$:     CMPB    20(RPTR), #1                                    ; 6924
                                                DC   13 0014A          BEQL    15$                                             ;
```

```
                        10   A9          52   D1 0014C          CMPL    RPTR, 16(RSTPTR)                        ; 6925
                                         06   12 00150          BNEQ    18$
                        10   A9          50   D0 00152          MOVL    R0, 16(RSTPTR)                          ; 6928
                                         06   11 00156          BRB     19$                                     ; 6927
                             52     10   A2   D0 00158 18$:     MOVL    16(RPTR), RPTR                          ; 6932
                                         E8   11 0015C          BRB     17$                                     ; 6922
                               02   AA   95 0015E 19$:         TSTB    2(R10)                                  ; 6941
                                         77   13 00161          BEQL    24$
                             52          59   D0 00163          MOVL    RSTPTR, RPTR                            ; 6948
                               02   14   A2   91 00166 20$:     CMPB    20(RPTR), #2                            ; 6949
                                         2A   13 0016A          BEQL    22$
                               01   14   A2   91 0016C          CMPB    20(RPTR), #1                            ; 6951
                                         1E   12 00170          BNEQ    21$
                               04   AE   9F   00172            PUSHAB  PATHSTRING                              ; 6954
                                         5A   DD 00175          PUSHL   R10
                    00000000G  00          02   FB 00177      CALLS   #2, DBG$NPATHDESC_TO_CS
                               04   AE   DD   0017E            PUSHL   PATHSTRING                              ; 6955
                                         01   DD 00181          PUSHL   #1
                          00028C90   8F   DD   00183            PUSHL   #167056
                    00000000G  00          03   FB 00189      CALLS   #3, LIB$SIGNAL
                             52     10   A2   D0 00190 21$:     MOVL    16(RPTR), RPTR                          ; 6958
                                         D0   11 00194          BRB     20$                                     ; 6949
                             50     02   AA   9A 00196 22$:     MOVZBL  2(R10), R0                              ; 6965
                             53     FC A740   D0 0019A          MOVL    -4(PATHVEC)[R0], PNAME
                               0C   A2   DD   0019F            PUSHL   12(RPTR)                                ; 6966
                    00000000G  00          01   FB 001A2      CALLS   #1, DBG$GET_DST_NAME
                             52          63   9A 001A9          MOVZBL  (PNAME), R2                             ; 6967
                             51          60   9A 001AC          MOVZBL  (RNAME), R1
          51        00         01   A3   52   2D 001AF          CMPC5   R2, 1(PNAME), #0, R1, 1(RNAME)
                                    01   A0        001B5
                                         1E   13 001B7          BEQL    23$
                               04   AE   9F   001B9            PUSHAB  PATHSTRING                              ; 6970
                                         5A   DD 001BC          PUSHL   R10
                    00000000G  00          02   FB 001BE      CALLS   #2, DBG$NPATHDESC_TO_CS
                               04   AE   DD   001C5            PUSHL   PATHSTRING                              ; 6971
                                         01   DD 001C8          PUSHL   #1
                          00028C90   8F   DD   001CA            PUSHL   #167056
                    00000000G  00          03   FB 001D0      CALLS   #3, LIB$SIGNAL
                               04   AA   D5   001D7 23$:       TSTL    4(R10)                                  ; 6979
                                         0D   13 001DA 24$:     BEQL    26$
                               04   AA   DD   001DC            PUSHL   4(R10)                                  ; 6981
                                         59   DD 001DF 25$:     PUSHL   RSTPTR
                          D289   CF          02   FB 001E1      CALLS   #2, DBG$BUILD_INVOC_RST
                             59          50   D0 001E6          MOVL    R0, RSTPTR
                                   00C5  31   001E9 26$:       BRW     33$                                     ; 6998
                               08   AE   9F   001EC 27$:       PUSHAB  NUMSCP_INVOC_NUM                        ; 7006
                               10   AE   9F   001EF            PUSHAB  SCOPE
                               18   AE   9F   001F2            PUSHAB  MODPTR
                               2C   AE   DD   001F5            PUSHL   SCOPENTRY+12
                          E54A   CF          04   FB 001F8      CALLS   #4, DBG$STA_NUMBERED_SCOPE
                               0C   AE   D5   001FD            TSTL    SCOPE                                   ; 7008
                                         0F   13 00200          BEQL    28$
                        10   A9          0C   AE   D0 00202    MOVL    SCOPE, 16(RSTPTR)                       ; 7011
                                    08   AE   D5 00207          TSTL    NUMSCP_INVOC_NUM                        ; 7012
                                         DD   13 0020A          BEQL    26$
                                    08   AE   DD 0020C          PUSHL   NUMSCP_INVOC_NUM                        ; 7014
                                         CE   11 0020F          BRB     25$
```

```
                                52        20    AE   D0 00211 28$:     MOVL    SCOPENTRY+12, VALUE                          ; 7030
                                56              D4 00215              CLRL    LENGTH                                       ; 7031
                          50    52              0A   C7 00217 29$:     DIVL3   #10, VALUE, NEWVALUE                         ; 7034
                          51    50              0A   C5 0021B          MULL3   #10, NEWVALUE, R1                            ; 7035
                                51              52   C2 0021F          SUBL2   VALUE, R1                                    ;
                   24 AE46      30              51   83 00222          SUBB3   R1, #48, NUMTEMP[LENGTH]                     ;
                                                56   D6 00228          INCL    LENGTH                                       ; 7036
                                                50   D5 0022A          TSTL    NEWVALUE                                     ; 7037
                                                05   13 0022C          BEQL    30$                                          ;
                                52              50   D0 0022E          MOVL    NEWVALUE, VALUE                              ; 7038
                                                E4   11 00231          BRB     29$                                          ; 7032
                             24 AE46            56   90 00233 30$:     MOVB    LENGTH, NUMTEMP[LENGTH]                      ; 7041
                                51              01   CE 00238          MNEGL   #1, I                                        ; 7042
                                                0B   11 0023B          BRB     32$                                          ;
                          50    56              51   C3 0023D 31$:     SUBL3   I, LENGTH, R0                                ; 7043
                             30 AE41            24 AE40   90 00241     MOVB    NUMTEMP[R0], NUMNAME[I]                      ;
                          F1    51              56   F3 00248 32$:     AOBLEQ  LENGTH, I, 31$                               ;
                                50        0D    A6   9E 0024C          MOVAB   13(R6), R0                                   ; 7050
                                50              04   C6 00250          DIVL2   #4, R0                                       ; 7051
                                          0C    A0   9F 00253          PUSHAB  12(R0)                                       ; 7050
                      00000000G 00              01   FB 00256          CALLS   #1, DBG$GET_MEMORY                           ;
                             10 AE              50   D0 0025D          MOVL    R0, MODPTR                                   ;
                                57        10    AE   D0 00261          MOVL    MODPTR, R7                                   ; 7052
                                58        30    A7   9E 00265          MOVAB   48(R7), DSTPTR                               ;
                             0C A7              58   D0 00269          MOVL    DSTPTR, 12(R7)                               ; 7053
                             14 A7              01   90 0026D          MOVB    #1, 20(R7)                                   ; 7054
                                50        28    A7   9E 00271          MOVAB   40(R7), R0                                   ; 7055
                             01 A0 00000000G    00   90 00275          MOVB    DBG$GB_LANGUAGE, 1(R0)                       ;
                             20 A7        20    AE   D0 0027D          MOVL    SCOPENTRY+12, 32(R7)                         ; 7056
                                60              0B   88 00282          BISB2   #11, (R0)                                    ; 7059
                          68    56              07   81 00285          ADDB3   #7, LENGTH, (DSTPTR)                         ; 7064
                             01 A8        BC    8F   90 00289          MOVB    #-68, 1(DSTPTR)                              ; 7065
                             03 A8        01    A0   9A 0028E          MOVZBL  1(R0), 3(DSTPTR)                             ; 7066
                                50        01    A6   9E 00293          MOVAB   1(R6), R0                                    ; 7067
                       07    A8        30    AE   28 00297          MOVC3   R0, NUMNAME, 7(DSTPTR)                       ;
                                58        08 A648   9E 0029D          MOVAB   8(LENGTH)[DSTPTR], DSTPTR                    ; 7068
                                68      BD01    8F   B0 002A2          MOVW    #48385, (DSTPTR)                             ; 7069
                                67              6B   D0 002A7          MOVL    RST$TEMP_LIST, (R7)                          ; 7077
                                6B              57   D0 002AA          MOVL    R7, RST$TEMP_LIST                            ; 7078
                             10 A9              57   D0 002AD          MOVL    R7, 16(RSTPTR)                               ; 7079
                                50              59   D0 002B1 33$:     MOVL    RSTPTR, R0                                   ; 7080
                                                04   002B4              RET                                                  ; 6998
                                                50   D4 002B5 34$:     CLRL    R0                                           ; 7092
                                                04   002B7              RET                                                  ;

; Routine Size:  696 bytes,    Routine Base:  DBG$CODE + 2C6A
```

```
;  7001     7093  1 ROUTINE GET_RECORD_ADDRESS( Primptr, Inner_outer_flag ) =
;  7002     7094  1 !
;  7003     7095  1 ! FUNCTION
;  7004     7096  1 !       GET_RECORD_ADDRESS returns the address of the inner or outer record
;  7005     7097  1 !       based on the primary pointer and the flag passed.
;  7006     7098  1 !       It's called from the stack machine when the value of a record's field
;  7007     7099  1 !       depends on the contents of the record.
;  7008     7100  1 !
;  7009     7101  1 ! INPUTS
;  7010     7102  1 !       Primptr          - A pointer to a primary descriptor passed by value.
;  7011     7103  1 !       Inner_outer_flag - A flag indicating whether the inner or outer record
;  7012     7104  1 !                          address should be returned.
;  7013     7105  1 !
;  7014     7106  1 ! OUTPUTS
;  7015     7107  1 !       The address of the record.
;  7016     7108  1 !
;  7017     7109  1 ! SIDE EFFECTS
;  7018     7110  1 !       Errors may be signaled
;  7019     7111  1 !
;  7020     7112  2     BEGIN
;  7021     7113  2
;  7022     7114  2     LOCAL
;  7023     7115  2         Current_subnode : REF DBG$PRIM_NODE,                    ! Pointer to the current subnode
;  7024     7116  2         Err_vec,                                                ! Returned by DBG$NCOPY_DESC
;  7025     7117  2         Local_current_primary,                                  ! For DBG$GL_CURRENT_PRIMARY
;  7026     7118  2         Local_primary : REF DBG$PRIMARY,                        ! Pointer to the copied primary
;  7027     7119  2         Local_val_desc : REF DBG$VALDESC;                       ! Local value descriptor
;  7028     7120  2
;  7029     7121  2     !++
;  7030     7122  2     ! Check for a no Primary
;  7031     7123  2     !--
;  7032     7124  2     IF .Primptr EQLA 0
;  7033     7125  2     THEN
;  7034     7126  2         $DBG_ERROR( 'RSTACCESS\GET_RECORD_ADDRESS - zero primary' );
;  7035     7127  2
;  7036     7128  2     !++
;  7037     7129  2     ! Make a copy of the current primary so we can mangle it
;  7038     7130  2     !--
;  7039     7131  2     IF NOT DBG$NCOPY_DESC( .Primptr, Local_primary, Err_vec, FALSE )
;  7040     7132  2     THEN
;  7041     7133  3         BEGIN
;  7042     7134  3         EXTERNAL ROUTINE
;  7043     7135  3             LIB$SIGNAL : ADDRESSING_MODE(GENERAL);
;  7044     7136  3         BUILTIN
;  7045     7137  3             CALLG;
;  7046     7138  3         CALLG (.Err_vec, LIB$SIGNAL );
;  7047     7139  2         END;
;  7048     7140  2
;  7049     7141  2     !++
;  7050     7142  2     ! Loop backwards on the primary.
;  7051     7143  2     !   1. If we wrap around we know that we want just the first subnode
;  7052     7144  2     !      i.e.  A.B.C where A is the record whose address we want.
;  7053     7145  2     !   2. If we find a TPTR we know we want it and its object.
;  7054     7146  2     !      i.e. Q.P^A.B.C where Q.P^ is what we want.
;  7055     7147  2     !   3. If we want the inner most record we stop when we see a record
;  7056     7148  2     !      subnode.
;  7057     7149  2     !--
```

```
;  7058     7150  2     Current_subnode = .Local_primary[ DBG$L_PRIM_BLINK ];
;  7059     7151  2     WHILE .Current_subnode NEQ Local_primary[ DBG$L_PRIM_FLINK ] DO
;  7060     7152  3         BEGIN
;  7061     7153  3         SELECTONE .Current_subnode[ DBG$B_PNODE_FCODE ] OF
;  7062     7154  3         SET
;  7063     7155  3
;  7064     7156  3         [RST$K_TYPE_RECORD]:
;  7065     7157  3             IF .Inner_outer_flag EQL Inner
;  7066     7158  3             THEN
;  7067     7159  3                 EXITLOOP;
;  7068     7160  3
;  7069     7161  3         [RST$K_TYPE_TPTR,
;  7070     7162  3          RST$K_TYPE_PTR]:
;  7071     7163  4             BEGIN
;  7072     7164  4             Current_subnode = .Current_subnode[ DBG$L_PNODE_FLINK ];
;  7073     7165  4             EXITLOOP;
;  7074     7166  3             END;
;  7075     7167  3
;  7076     7168  3         TES;
;  7077     7169  3
;  7078     7170  3         Current_subnode = .Current_subnode[ DBG$L_PNODE_BLINK ];
;  7079     7171  2         END;
;  7080     7172  2
;  7081     7173  2     ! Go forward one if we wrapped around
;  7082     7174  2     !
;  7083     7175  2     IF .Current_subnode EQL Local_primary[ DBG$L_PRIM_FLINK ]
;  7084     7176  2     THEN
;  7085     7177  2         Current_subnode = .Current_subnode[ DBG$L_PNODE_FLINK ];
;  7086     7178  2
;  7087     7179  2     ! Check that all is well
;  7088     7180  2     !
;  7089     7181  2     IF .Current_subnode[ DBG$B_PNODE_FCODE ] NEQ RST$K_TYPE_RECORD
;  7090     7182  2     THEN
;  7091     7183  2         $DBG_ERROR( 'RSTACCESS\GET_RECORD_ADDRESS - No record in Primary desc. Bad DST' );
;  7092     7184  2
;  7093     7185  2     ! Trim off what we don't want
;  7094     7186  2     !
;  7095     7187  2     Local_primary[ DBG$L_PRIM_BLINK ] = .Current_subnode;
;  7096     7188  2     Current_subnode[ DBG$L_PNODE_FLINK ] = Local_primary[ DBG$L_PRIM_FLINK ];
;  7097     7189  2
;  7098     7190  2     ! Save DBG$GL_CURRENT_PRIMARY because DBG$PRIM_TO_VAL updates it
;  7099     7191  2     !
;  7100     7192  2     Local_current_primary = .DBG$GL_CURRENT_PRIMARY;
;  7101     7193  2
;  7102     7194  2     ! Get the value
;  7103     7195  2     !
;  7104     7196  2     IF NOT DBG$PRIM_TO_VAL( .Local_primary, DBG$K_V_VALUE_DESC, Local_val_desc )
;  7105     7197  2     THEN
;  7106     7198  2         $DBG_ERROR( 'RSTACCESS\GET_RECORD_ADDRESS - DBG$PRIM_TO_VAL failed.  Bad DST' );
;  7107     7199  2
;  7108     7200  2     ! Restore DBG$GL_CURRENT_PRIMARY because DBG$PRIM_TO_VAL updates it
;  7109     7201  2     !
;  7110     7202  2     DBG$GL_CURRENT_PRIMARY = .Local_current_primary;
;  7111     7203  2
;  7112     7204  2     RETURN .Local_val_desc[ DBG$L_VALUE_POINTER ];
;  7113     7205  2
;  7114     7206  1     END;
```

```
                                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

5F 54 45 47 5C 53 53 45 43 43 41 54 53 52 2B 00498 P.AEF:    .ASCII  \+RSTACCESS\<92>\GET_RECORD_ADDRESS - ze\
20 53 53 45 52 44 44 41 5F 44 52 4F 43 45 52 004A7
                                              65 7A 20 2D 004B6
                        79 72 61 6D 69 72 70 20 6F 72 004BA          .ASCII  \ro primary\
5F 54 45 47 5C 53 53 45 43 43 41 54 53 52 41 004C4 P.AEG:    .ASCII  \ARSTACCESS\<92>\GET_RECORD_ADDRESS - No\
20 53 53 45 52 44 44 41 5F 44 52 4F 43 45 52 004D3
                                              6F 4E 20 2D 004E2
6D 69 72 50 20 6E 69 20 64 72 6F 63 65 72 20 004E6          .ASCII  \ record in Primary desc. Bad DST\
44 20 64 61 42 20 2E 63 73 65 64 20 79 72 61 004F5
                                              54 53 00504
5F 54 45 47 5C 53 53 45 43 43 41 54 53 52 3F 00506 P.AEH:    .ASCII  \?RSTACCESS\<92>\GET_RECORD_ADDRESS - DB\
20 53 53 45 52 44 44 41 5F 44 52 4F 43 45 52 00515
                                              42 44 20 2D 00524
66 20 4C 41 56 5F 4F 54 5F 4D 49 52 50 24 47 00528          .ASCII  \G$PRIM_TO_VAL failed.  Bad DST\
54 53 44 20 64 61 42 20 20 2E 64 65 6C 69 61 00537

                                                                                .EXTRN  LIB$SIGNAL

                                                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                                00FC 00000 GET_RECORD_ADDRESS:
                                                                                .WORD   Save R2,R3,R4,R5,R6,R7                          ; 7093
                                    57 00000000G   00   9E 00002                MOVAB   DBG$GL_CURRENT_PRIMARY, R7                      ;
                                    56 00000000'   EF   9E 00009                MOVAB   P.AEF, R6                                       ;
                                    55 00000000G   00   9E 00010                MOVAB   LIB$SIGNAL, R5                                  ;
                                    5E             0C   C2 00017                SUBL2   #12, SP                                         ;
                                                   04   AC D5 0001A             TSTL    PRIMPTR                                         ; 7124
                                                        0D 12 0001D             BNEQ    1$                                              ;
                                                        56 DD 0001F             PUSHL   R6                                              ; 7126
                                                        01 DD 00021             PUSHL   #1                                              ;
                                                 00028362 8F DD 00023           PUSHL   #164706                                         ;
                                                        65 03 FB 00029          CALLS   #3, LIB$SIGNAL                                  ;
                                                        7E D4 0002C 1$:         CLRL    -(SP)                                           ; 7131
                                                   04   AE 9F 0002E             PUSHAB  ERR_VEC                                         ;
                                                   0C   AE 9F 00031             PUSHAB  LOCAL_PRIMARY                                   ;
                                                   04   AC DD 00034             PUSHL   PRIMPTR                                         ;
                                          00000000G 00      04 FB 00037        CALLS   #4, DBG$NCOPY_DESC                              ;
                                                   04      50 E8 0003E          BLBS    R0, 2$                                          ;
                                                   65   00 BE FA 00041          CALLG   @ERR_VEC, LIB$SIGNAL                            ; 7138
                                                   53   04 AE D0 00045 2$:      MOVL    LOCAL_PRIMARY, R3                               ; 7150
                                                   52   18 A3 D0 00049          MOVL    24(R3), CURRENT_SUBNODE                         ;
                                                   54   14 A3 9E 0004D          MOVAB   20(R3), R4                                      ; 7151
                                                   54      52 D1 00051 3$:      CMPL    CURRENT_SUBNODE, R4                             ;
                                                           26 13 00054          BEQL    7$                                              ;
                                                   50   09 A2 9A 00056          MOVZBL  9(CURRENT_SUBNODE), R0                          ; 7153
                                                   07      50 91 0005A          CMPB    R0, #7                                          ; 7156
                                                           08 12 0005D          BNEQ    4$                                              ;
                                                   02   08 AC D1 0005F          CMPL    INNER_OUTER_FLAG, #2                            ; 7157
                                                           11 12 00063          BNEQ    6$                                              ;
                                                           15 11 00065          BRB     7$                                              ; 7159
                                                   06      50 91 00067 4$:      CMPB    R0, #6                                          ; 7161
                                                           05 13 0006A          BEQL    5$                                              ;
```

```
                10              50  91 0006C            CMPB    R0, #16                                         ;
                                05  12 0006F            BNEQ    6$                                              ;
                52                  62 D0 00071 5$:     MOVL    (CURRENT_SUBNODE), CURRENT_SUBNODE              ; 7164
                                    06 11 00074         BRB     7$                                              ; 7163
                52              04  A2 D0 00076 6$:     MOVL    4(CURRENT_SUBNODE), CURRENT_SUBNODE             ; 7170
                                    D5 11 0007A         BRB     3$                                              ; 7151
                54                  52 D1 0007C 7$:     CMPL    CURRENT_SUBNODE, R4                             ; 7175
                                    03 12 0007F         BNEQ    8$                                              ;
                52                  62 D0 00081         MOVL    (CURRENT_SUBNODE), CURRENT_SUBNODE              ; 7177
                07              09  A2 91 00084 8$:     CMPB    9(CURRENT_SUBNODE), #7                          ; 7181
                                0E  13 00088            BEQL    9$                                              ;
                            2C  A6 9F 0008A             PUSHAB  P.AEG                                           ; 7183
                                01  DD 0008D           PUSHL   #1                                              ;
                    00028362    8F  DD 0008F           PUSHL   #164706                                         ;
                65              03  FB 00095           CALLS   #3, LIB$SIGNAL                                  ;
            18  A3                  52 D0 00098 9$:     MOVL    CURRENT_SUBNODE, 24(R3)                         ; 7187
                62                  54 D0 0009C         MOVL    R4, (CURRENT_SUBNODE)                           ; 7188
                52                  67 D0 0009F         MOVL    DBG$GL_CURRENT_PRIMARY, -                       ; 7192
                                                                    LOCAL_CURRENT_PRIMARY                       ;
                            08  AE 9F 000A2             PUSHAB  LOCAL_VAL_DESC                                  ; 7196
                7E          83  8F 9A 000A5           MOVZBL  #131, -(SP)                                     ;
                                53  DD 000A9           PUSHL   R3                                              ;
    00000000G   00              03  FB 000AB           CALLS   #3, DBG$PRIM_TO_VAL                             ;
                0E                  50 E8 000B2         BLBS    R0, 10$                                         ;
                            6E  A6 9F 000B5             PUSHAB  P.AEH                                           ; 7198
                                01  DD 000B8           PUSHL   #1                                              ;
                    00028362    8F  DD 000BA           PUSHL   #164706                                         ;
                65              03  FB 000C0           CALLS   #3, LIB$SIGNAL                                  ;
                67                  52 D0 000C3 10$:    MOVL    LOCAL_CURRENT_PRIMARY, -                        ; 7202
                                                                    DBG$GL_CURRENT_PRIMARY                      ;
                50          08  AE D0 000C6             MOVL    LOCAL_VAL_DESC, R0                              ; 7204
                50          18  A0 D0 000CA             MOVL    24(R0), R0                                      ;
                                    04 000CE            RET                                                     ; 7206

; Routine Size:  207 bytes,    Routine Base:  DBG$CODE + 2F22
```

```
;  7116          7207  1 ROUTINE GET_REGISTER_VALUES(CURRENT_FP, RUNFRAME_PTR, REGVECTOR): NOVALUE =
;  7117          7208  1 !
;  7118          7209  1 ! FUNCTION
;  7119          7210  1 !       This routine determines the register values associated with a given
;  7120          7211  1 !       CALL frame on the VAX call stack.  It accepts a PC value and a frame
;  7121          7212  1 !       pointer value and some other arguments as input, and produces a vector
;  7122          7213  1 !       of register save addresses as output.  By indirecting through those
;  7123          7214  1 !       save addresses, the actual register values associated with the given
;  7124          7215  1 !       CALL frame can be obtained.
;  7125          7216  1 !
;  7126          7217  1 !       In addition to getting the addresses of all registers saved in a normal
;  7127          7218  1 !       CALL frame, this routine understands how to get the register values
;  7128          7219  1 !       associated with the CALL frames generated by calls on exception hand-
;  7129          7220  1 !       lers (which have a return address pointing into system space) and by
;  7130          7221  1 !       DEBUG CALL commands (which have a return address pointing into DEBUG).
;  7131          7222  1 !       In the case of calls on exception handlers, some register values (in-
;  7132          7223  1 !       cluding the PC) must be gotten from the exception handler's signal and
;  7133          7224  1 !       mechanism arguments.  In the case of DEBUG CALL commands, all of the
;  7134          7225  1 !       register values of the next stack frame must be gotten from DEBUG's
;  7135          7226  1 !       stack of saved run-frames.
;  7136          7227  1 !
;  7137          7228  1 ! INPUTS
;  7138          7229  1 !       CURRENT_FP - The address of the CALL frame from which the new set of
;  7139          7230  1 !                    register save locations is to be extracted.  This is thus
;  7140          7231  1 !                    the value of FP in the called routine.
;  7141          7232  1 !
;  7142          7233  1 !       RUNFRAME_PTR - The address of a longword which must be initialized to
;  7143          7234  1 !                      contain the value .DBG$RUNFRAME[DBG$L_NEXT_LINK] before this
;  7144          7235  1 !                      this routine is called in the course of looping through the
;  7145          7236  1 !                      CALL stack.
;  7146          7237  1 !
;  7147          7238  1 !       REGVECTOR - The address of a 17-longword vector to receive all register
;  7148          7239  1 !                   save addresses from the current CALL frame.
;  7149          7240  1 !
;  7150          7241  1 ! OUTPUTS
;  7151          7242  1 !       RUNFRAME_PTR - The RUNFRAME_PTR location is updated to point to the
;  7152          7243  1 !                      next saved run-frame on the CALL command run-frame stack
;  7153          7244  1 !                      each time one such run-frame is accessed to get the register
;  7154          7245  1 !                      values of the routine which was active at the time of the
;  7155          7246  1 !                      CALL command.
;  7156          7247  1 !
;  7157          7248  1 !       REGVECTOR - The addresses at which registers 0 - 16 are saved for the
;  7158          7249  1 !                   given CALL frame are returned to longwords 0 - 16 of the
;  7159          7250  1 !                   REGVECTOR vector.  (Register 16 is the PSW in this context.)
;  7160          7251  1 !
;  7161          7252  1
;  7162          7253  2     BEGIN
;  7163          7254  2
;  7164          7255  2     MAP
;  7165          7256  2         CURRENT_FP: REF BLOCK[,BYTE],   ! The address of the current CALL frame
;  7166          7257  2         RUNFRAME_PTR: REF VECTOR[1],    ! Pointer to saved-runframe pointer
;  7167          7258  2         REGVECTOR: REF VECTOR[,LONG];   ! Pointer to the vector of register
;  7168          7259  2                                         !      save location addresses
;  7169          7260  2
;  7170          7261  2     OWN
;  7171          7262  2         SPVALUE: REF VECTOR[,LONG];     ! Current CALL frame's SP value
;  7172          7263  2
```

```
;  7173          7264  2     LOCAL
;  7174          7265  2         CALLER_PC,                      ! The PC of the caller of the current
;  7175          7266  2                                         !     routine (the return address)
;  7176          7267  2         J,                              ! Index value used for several purposes
;  7177          7268  2         MECH_VECTOR: REF BLOCK[,BYTE],  ! Pointer to Mechanism Argument Vector
;  7178          7269  2         REGMASK: BITVECTOR[16],         ! The register save mask bit vector
;  7179          7270  2         REGSAVELOC: REF VECTOR[,LONG],  ! Pointer to CALL frame register save
;  7180          7271  2                                         !     area for registers R0 - R11
;  7181          7272  2         REGPTR: REF VECTOR[,LONG],      ! Pointer to a register's save location
;  7182          7273  2         REGVEC: VECTOR[17, LONG],       ! Vector of pointers to save areas for
;  7183          7274  2         SAVED_REGVECTOR:                ! Pointer to vector of saved registers
;  7184          7275  2                 REF VECTOR[,LONG],      !     in saved CALL command runframe
;  7185          7276  2         SAVED_RUNFRAME:                 ! Pointer to saved runframe from the
;  7186          7277  2                 REF BLOCK[,BYTE],       !     DEBUG CALL command
;  7187          7278  2         SIG_VECTOR: REF VECTOR[,LONG];  ! Pointer to the Signal Argument Vector
;  7188          7279  2
;  7189          7280  2
;  7190          7281  2
;  7191          7282  2     ! Get the return PC stored in the current CALL frame.
;  7192          7283  2     !
;  7193          7284  2     CALLER_PC = .CURRENT_FP[SF$L_SAVE_PC];
;  7194          7285  2
;  7195          7286  2
;  7196          7287  2     ! Check to see if this is an exception handler.  (A handler is recognized
;  7197          7288  2     ! by having a return PC of hex 80000014, which is where the VMS exception
;  7198          7289  2     ! handling mechanism calls user handlers.)  If this is an exception hand-
;  7199          7290  2     ! ler, we must get the register values of the signaller from the current
;  7200          7291  2     ! call frame, from the signal arguments, and from the mechanism arguments,
;  7201          7292  2     ! depending on the register.
;  7202          7293  2     !
;  7203          7294  2     IF .CALLER_PC EQL %X'80000014'
;  7204          7295  2     THEN
;  7205          7296  3         BEGIN
;  7206          7297  3
;  7207          7298  3
;  7208          7299  3         ! Extract the save addresses of AP and FP for this CALL frame.
;  7209          7300  3         !
;  7210          7301  3         REGVECTOR[12] = CURRENT_FP[SF$L_SAVE_AP];
;  7211          7302  3         REGVECTOR[13] = CURRENT_FP[SF$L_SAVE_FP];
;  7212          7303  3
;  7213          7304  3
;  7214          7305  3         ! Extract the save locations of all other saved registers in this CALL
;  7215          7306  3         ! frame.
;  7216          7307  3         !
;  7217          7308  3         REGMASK = .CURRENT_FP[SF$W_SAVE_MASK];
;  7218          7309  3         REGSAVELOC = CURRENT_FP[SF$L_SAVE_REGS];
;  7219          7310  3         J = 0;
;  7220          7311  3         INCR I FROM 0 TO 11 DO
;  7221          7312  4             BEGIN
;  7222          7313  4             IF .REGMASK[.I]
;  7223          7314  4             THEN
;  7224          7315  5                 BEGIN
;  7225          7316  5                 REGVECTOR[.I] = REGSAVELOC[.J];
;  7226          7317  5                 J = .J + 1;
;  7227          7318  4                 END;
;  7228          7319  4
;  7229          7320  3             END;
```

```
;  7230     7321  3
;  7231     7322
;  7232     7323
;  7233     7324          ! Set the stack pointer to point at the end of the saved registers.
;  7234     7325          ! Adjust it by the offset value.  Also pass the one longword of junk
;  7235     7326          ! the VMS signal mechanism puts on the stack (a JSB return address).
;  7236     7327          !
;  7237     7328          SPVALUE = REGSAVELOC[.J];
;  7238     7329          SPVALUE = .SPVALUE + .CURRENT_FP[SF$V_STACKOFFS];
;  7239     7330          SPVALUE = .SPVALUE + 4;
;  7240     7331
;  7241     7332          ! Get the pointer to the signal argument list and pick up the address
;  7242     7333          ! of the saved PC in the signal argument list.  We also pick up the
;  7243     7334          ! address of the saved PSL in the signal argument list.
;  7244     7335          !
;  7245     7336          SIG_VECTOR = .SPVALUE[1];
;  7246     7337          J = .SIG_VECTOR[0];
;  7247     7338          REGVECTOR[15] = SIG_VECTOR[.J - 1];
;  7248     7339          REGVECTOR[16] = SIG_VECTOR[.J];
;  7249     7340
;  7250     7341
;  7251     7342          ! Get the pointer to the mechanism argument list and pick up the save
;  7252     7343          ! addresses of the signaller's values of R0 and R1.
;  7253     7344          !
;  7254     7345          MECH_VECTOR = .SPVALUE[2];
;  7255     7346          REGVECTOR[0] = MECH_VECTOR[CHF$L_MCH_SAVR0];
;  7256     7347          REGVECTOR[1] = MECH_VECTOR[CHF$L_MCH_SAVR1];
;  7257     7348
;  7258     7349
;  7259     7350  3       ! Finally compute the SP value by skipping past the exception handler
;  7260     7351  3       ! argument list, the list of signal arguments, one longword of trash,
;  7261     7352  3       ! and the list of mechanism arguments.
;  7262     7353  3       !
;  7263     7354  3       SPVALUE = SPVALUE[.SPVALUE[0] + 1];
;  7264     7355  3       SPVALUE = SPVALUE[.SPVALUE[0] + 1];
;  7265     7356  3       SPVALUE = .SPVALUE + 4;
;  7266     7357  3       SPVALUE = SPVALUE[.SPVALUE[0] + 1];
;  7267     7358  3       REGVECTOR[14] = SPVALUE;
;  7268     7359  3       END
;  7269     7360  3
;  7270     7361  3
;  7271     7362  3     ! Check to see if the current routine was called with a DEBUG CALL command.
;  7272     7363  3     ! (A CALL command is recognized by the DBG$PSEUDO_EXIT return address.)
;  7273     7364  3     ! If so, we must dig out all the register values as they were at the time
;  7274     7365  3     ! of the CALL.  We dig out the save locations of these values from the run-
;  7275     7366  3     ! frame at our current location on the saved-runframe stack.
;  7276     7367  3     !
;  7277     7368  2     ELSE IF .CALLER_PC EQL DBG$PSEUDO_EXIT
;  7278     7369  2     THEN
;  7279     7370  3         BEGIN
;  7280     7371  3         SAVED_RUNFRAME = .RUNFRAME_PTR[0];
;  7281     7372  3         SAVED_REGVECTOR = SAVED_RUNFRAME[DBG$L_USER_R0];
;  7282     7373  3         INCR I FROM 0 TO 16 DO
;  7283     7374  3             REGVECTOR[.I] = SAVED_REGVECTOR[.I];
;  7284     7375  3
;  7285     7376  3         RUNFRAME_PTR[0] = .SAVED_RUNFRAME[DBG$L_NEXT_LINK];
;  7286     7377  3         END
```

```
;  7287     7378  3
;  7288     7379  3
;  7289     7380  3        ! For any other case, we have a normal CALL frame on the stack and we can
;  7290     7381  3        ! dig out the register values in the normal way.  That is done here.
;  7291     7382  3        !
;  7292     7383  2        ELSE
;  7293     7384  2            BEGIN
;  7294     7385  2
;  7295     7386  2
;  7296     7387  2            ! Get the save locations of all registers of the set R0 - R11 that are
;  7297     7388  2            ! saved in this CALL frame.  Save those addresses in REGVECTOR.
;  7298     7389  2            !
;  7299     7390  2            REGMASK = .CURRENT_FP[SF$W_SAVE_MASK];
;  7300     7391  2            REGSAVELOC = CURRENT_FP[SF$L_SAVE_REGS];
;  7301     7392  2            J = 0;
;  7302     7393  2            INCR I FROM 0 TO 11 DO
;  7303     7394  3                BEGIN
;  7304     7395  3                IF .REGMASK[.I]
;  7305     7396  3                THEN
;  7306     7397  4                    BEGIN
;  7307     7398  4                    REGVECTOR[.I] = REGSAVELOC[.J];
;  7308     7399  4                    J = .J + 1;
;  7309     7400  4                    END;
;  7310     7401  3
;  7311     7402  3                END;
;  7312     7403  2
;  7313     7404  2
;  7314     7405  2            ! If R0 or R1 is not saved, we zero the corresponding REGVECTOR cells
;  7315     7406  2            ! to indicate that those registers are not available at all--R0 and R1
;  7316     7407  2            ! are not preserved over subroutine calls.
;  7317     7408  2            !
;  7318     7409  2            IF NOT .REGMASK[0] THEN REGVECTOR[0] = 0;
;  7319     7410  2            IF NOT .REGMASK[1] THEN REGVECTOR[1] = 0;
;  7320     7411  2
;  7321     7412  2
;  7322     7413  2            ! Get the addresses of the save locations for registers AP, FP, SP,
;  7323     7414  2            ! PC, and PSW.  Store those addresses in REGVECTOR.
;  7324     7415  2            !
;  7325     7416  2            REGVECTOR[12] = CURRENT_FP[SF$L_SAVE_AP];
;  7326     7417  2            REGVECTOR[13] = CURRENT_FP[SF$L_SAVE_FP];
;  7327     7418  2            REGVECTOR[14] = SPVALUE;
;  7328     7419  2            REGVECTOR[15] = CURRENT_FP[SF$L_SAVE_PC];
;  7329     7420  2            REGVECTOR[16] = CURRENT_FP[SF$W_SAVE_PSW];
;  7330     7421  2
;  7331     7422  2
;  7332     7423  2            ! Determine the value of SP (the Stack Pointer) by pointing it to the
;  7333     7424  2            ! end of the register save area, adjusting it by the offset value, and
;  7334     7425  2            ! pointing it past the CALLS argument list (if any).  Save the computed
;  7335     7426  2            ! SP value in SPVALUE.
;  7336     7427  2            !
;  7337     7428  2            SPVALUE = REGSAVELOC[.J];
;  7338     7429  2            SPVALUE = .SPVALUE + .CURRENT_FP[SF$V_STACKOFFS];
;  7339     7430  2            IF .CURRENT_FP[SF$V_CALLS] THEN SPVALUE = .SPVALUE + 4*(.SPVALUE[0] + 1);
;  7340     7431  2            END;
;  7341     7432  2
;  7342     7433  2
;  7343     7434  2        ! We are done getting the register values and can now return.
```

```
;  7344          7435  2     !
;  7345          7436  2     RETURN;
;  7346          7437  2
;  7347          7438  1     END;


                                        .PSECT  DBG$OWN,NOEXE,  PIC,2

                                00058 SPVALUE:.BLKB   4


                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                01FC 00000 GET_REGISTER_VALUES:
                                        .WORD   Save R2,R3,R4,R5,R6,R7,R8                ;  7207
                    58 00000000'  EF  9E 00002          MOVAB   SPVALUE, R8              ;
                    5E        BC  AE  9E 00009          MOVAB   -68(SP), SP              ;
                    56        04  AC  D0 0000D          MOVL    CURRENT_FP, R6           ;  7284
                    51        10  A6  D0 00011          MOVL    16(R6), CALLER_PC        ;
                    53        0C  AC  D0 00015          MOVL    REGVECTOR, R3            ;  7301
              80000014        8F      51  D1 00019      CMPL    CALLER_PC, #-2147483628  ;  7294
                                      7F  12 00020      BNEQ    3$                       ;
                    30  A3        08  A6  9E 00022      MOVAB   8(R6), 48(R3)            ;  7301
                    34  A3        0C  A6  9E 00027      MOVAB   12(R6), 52(R3)           ;  7302
                    57        06  A6  B0 0002C          MOVW    6(R6), REGMASK           ;  7308
                    51        14  A6  9E 00030          MOVAB   20(R6), REGSAVELOC       ;  7309
                                      55  D4 00034      CLRL    J                        ;  7310
                                      50  D4 00036      CLRL    I                        ;  7311
                07                    57  50  E1 00038  1$:   BBC     I, REGMASK, 2$       ;  7313
                              6340        6145  DE 0003C      MOVAL   (REGSAVELOC)[J], (R3)[I] ;  7316
                                      55  D6 00041      INCL    J                        ;  7317
                F1                    50  0B  F3 00043  2$:   AOBLEQ  #11, I, 1$          ;  7311
                                      68  6145  DE 00047      MOVAL   (REGSAVELOC)[J], SPVALUE ;  7327
          50    07  A6                02  06  EF 0004B      EXTZV   #6, #2, 7(R6), R0        ;  7328
                                      68  50  C0 00051      ADDL2   R0, SPVALUE              ;
                                      68  04  C0 00054      ADDL2   #4, SPVALUE              ;  7329
                                      50  68  D0 00057      MOVL    SPVALUE, R0              ;  7336
                                      52  04  A0 0005A      MOVL    4(R0), SIG_VECTOR        ;
                                      55  62  D0 0005E      MOVL    (SIG_VECTOR), J          ;  7337
                          3C  A3        FC  A245  DE 00061      MOVAL   -4(SIG_VECTOR)[J], 60(R3) ;  7338
                          40  A3          6245  DE 00067      MOVAL   (SIG_VECTOR)[J], 64(R3)  ;  7339
                                      51  08  A0 0006C      MOVL    8(R0), MECH_VECTOR       ;  7345
                                      63  0C  A1 00070      MOVAB   12(R1), (R3)             ;  7346
                          04  A3        10  A1 00074      MOVAB   16(R1), 4(R3)            ;  7347
                                      50  60  D0 00079      MOVL    (R0), R0                 ;  7354
                                      78  9840  DE 0007C      MOVAL   @SPVALUE[R0], SPVALUE    ;
                                      68  04  C0 00080      ADDL2   #4, SPVALUE              ;
                                      50  00  B8 D0 00083      MOVL    @SPVALUE, R0             ;  7355
                                      78  9840  DE 00087      MOVAL   @SPVALUE[R0], SPVALUE    ;
                                      68  04  C0 0008B      ADDL2   #4, SPVALUE              ;
                                      68  04  C0 0008E      ADDL2   #4, SPVALUE              ;  7356
                                      50  00  B8 D0 00091      MOVL    @SPVALUE, R0             ;  7357
                                      78  9840  DE 00095      MOVAL   @SPVALUE[R0], SPVALUE    ;
                                      68  04  C0 00099      ADDL2   #4, SPVALUE              ;
                          38  A3        68  9E 0009C      MOVAB   SPVALUE, 56(R3)          ;  7358
```

```
                                                04 000A0                RET                                             ; 7294
                                 50 00000000G   00 9E 000A1 3$:         MOVAB   DBG$PSEUDO_EXIT, R0                     ; 7368
                                 50             51 D1 000A8             CMPL    CALLER_PC, R0                           ;
                                                18 12 000AB             BNEQ    5$                                      ;
                                 50       08    BC D0 000AD             MOVL    @RUNFRAME_PTR, SAVED_RUNFRAME           ; 7371
                                 52       04    A0 9E 000B1             MOVAB   4(R0), SAVED_REGVECTOR                  ; 7372
                                                54 D4 000B5             CLRL    I                                       ; 7374
                              6344              6244 DE 000B7 4$:         MOVAL   (SAVED_REGVECTOR)[I], (R3)[I]           ;
                    F7          54                10 F3 000BC             AOBLEQ  #16, I, 4$                              ;
                 08    BC                         60 D0 000C0             MOVL    (SAVED_RUNFRAME), @RUNFRAME_PTR         ; 7376
                                                04 000C4                RET                                             ; 7368
                                 57       06    A6 B0 000C5 5$:         MOVW    6(R6), REGMASK                          ; 7390
                                 51       14    A6 9E 000C9             MOVAB   20(R6), REGSAVELOC                      ; 7391
                                                55 D4 000CD             CLRL    J                                       ; 7392
                                                50 D4 000CF             CLRL    I                                       ; 7393
                    08           57                50 E1 000D1 6$:         BBC     I, REGMASK, 7$                          ; 7395
                 0C BC40                    6145 DE 000D5             MOVAL   (REGSAVELOC)[J], @REGVECTOR[I]          ; 7398
                                                55 D6 000DB             INCL    J                                       ; 7399
                    F0           50                0B F3 000DD 7$:         AOBLEQ  #11, I, 6$                              ; 7393
                                 03                57 E8 000E1             BLBS    REGMASK, 8$                             ; 7409
                                          0C    BC D4 000E4             CLRL    @REGVECTOR                              ;
                    07           57                01 E0 000E7 8$:         BBS     #1, REGMASK, 9$                         ; 7410
                                 50       0C    AC D0 000EB             MOVL    REGVECTOR, R0                           ;
                                          04    A0 D4 000EF             CLRL    4(R0)                                   ;
                                 30       08    A6 9E 000F2 9$:         MOVAB   8(R6), 48(R3)                           ; 7416
                                 34       0C    A6 9E 000F7             MOVAB   12(R6), 52(R3)                          ; 7417
                                 38             68 9E 000FC             MOVAB   SPVALUE, 56(R3)                         ; 7418
                                 3C       10    A6 9E 00100             MOVAB   16(R6), 60(R3)                          ; 7419
                                 40       04    A6 9E 00105             MOVAB   4(R6), 64(R3)                           ; 7420
                                 68                6145 DE 0010A             MOVAL   (REGSAVELOC)[J], SPVALUE                ; 7428
                50       07    A6                02 EF 0010E             EXTZV   #6, #2, 7(R6), R0                       ; 7429
                                 68                50 C0 00114             ADDL2   R0, SPVALUE                             ;
                         0B      07    A6          05 E1 00117             BBC     #5, 7(R6), 10$                          ; 7430
                                 50          00    B8 D0 0011C             MOVL    @SPVALUE, R0                            ;
                                 78              9840 DE 00120             MOVAL   @SPVALUE[R0], SPVALUE                   ;
                                 68                04 C0 00124             ADDL2   #4, SPVALUE                             ;
                                                04 00127 10$:           RET                                             ; 7438

; Routine Size:  296 bytes,    Routine Base:  DBG$CODE + 2FF1
```

```
;  7349     7439  1 ROUTINE SCOPE_RULE_COBOL(PATHNAME, NCANDS, CANDLST, SCOPE) =
;  7350     7440  1 !
;  7351     7441  1 ! FUNCTION
;  7352     7442  1 !       This routine selects the symbol from a specified list of candidate sym-
;  7353     7443  1 !       bols which best matches a specified pathname.  This routine assumes
;  7354     7444  1 !       COBOL scope rules when doing so.  This means that incomplete data quali-
;  7355     7445  1 !       fication is accepted, and that uniqueness is determined by these rules:
;  7356     7446  1 !
;  7357     7447  1 !           (1) By definition, the "lowest definition depth" is the
;  7358     7448  1 !               inner-most definition depth in the current scope at
;  7359     7449  1 !               which at least one candidate symbol is declared.
;  7360     7450  1 !
;  7361     7451  1 !           (2) If only one candidate symbol is defined at the lowest
;  7362     7452  1 !               definition depth, then that is the unique symbol we
;  7363     7453  1 !               want.
;  7364     7454  1 !
;  7365     7455  1 !           (3) Otherwise, the symbol is not unique.
;  7366     7456  1 !
;  7367     7457  1 !       An additional COBOL scope rule is that any candidate which is not marked
;  7368     7458  1 !       as "global" (i.e., does not have the RST$V_COBOLGBL bit set) may not be
;  7369     7459  1 !       declared outside the routine which contains the current scope.  In other
;  7370     7460  1 !       words, a COBOL symbol declared in one routine is not visible in any
;  7371     7461  1 !       nested routine unless it is specifically marked as being so visible.
;  7372     7462  1 !
;  7373     7463  1 !       The list of candidate symbols is produced by DBG$STA_GETSYMBOL, and each
;  7374     7464  1 !       candidate is guaranteed to be in the current scope being searched.  What
;  7375     7465  1 !       this routine must do is to determine which candidates have valid data
;  7376     7466  1 !       qualification, which candidate is defined at the lowest definition depth
;  7377     7467  1 !       (i.e., defined inner-most in the current scope), and whether that candi-
;  7378     7468  1 !       date is unique.  The routine then returns one of three things: an indi-
;  7379     7469  1 !       cation that no symbol was valid, an indication that the symbol is not
;  7380     7470  1 !       unique, or an index pointing to the one selected candidate symbol.
;  7381     7471  1 !
;  7382     7472  1 ! INPUTS
;  7383     7473  1 !       PATHNAME - Pointer to the pathname descriptor for the symbol name to
;  7384     7474  1 !                  be looked up in the symbol table.
;  7385     7475  1 !
;  7386     7476  1 !       NCANDS  - The number of candidate symbols found by DBG$STA_GETSYMBOL.
;  7387     7477  1 !
;  7388     7478  1 !       CANDLST - A vector of pointers to the "candidate blocks" for the candi-
;  7389     7479  1 !                 date symbols found by DBG$STA_GETSYMBOL.  Each of these candi-
;  7390     7480  1 !                 dates is in the scope currently searched.  The candidate block
;  7391     7481  1 !                 pointers are found in CANDLST[1] through CANDLST[.NCANDS].
;  7392     7482  1 !
;  7393     7483  1 !       SCOPE   - A pointer to the RST entry for the current scope in which the
;  7394     7484  1 !                 symbol is being looked up.  This normally points to a Routine
;  7395     7485  1 !                 RST Entry or a Lexical Block RST Entry.  (COBOL Sections and
;  7396     7486  1 !                 Paragraphs are represented as lexical blocks in DEBUG.)  If
;  7397     7487  1 !                 the current scope is the Global Scope (\) or All Set Modules,
;  7398     7488  1 !                 the SCOPE parameter is zero.
;  7399     7489  1 !
;  7400     7490  1 ! OUTPUTS
;  7401     7491  1 !       The CANDLST index for the candidate block which best matches the path-
;  7402     7492  1 !                 name is returned as the routine's value.  If no candidate is
;  7403     7493  1 !                 acceptable, zero is returned, and if more than one candidate
;  7404     7494  1 !                 is acceptable (the symbol is not unique), -1 is returned.
;  7405     7495  1 !
```

```
;  7406     7496  1
;  7407     7497  2      BEGIN
;  7408     7498  2
;  7409     7499  2      MAP
;  7410     7500  2          PATHNAME: REF PTH$PATHNAME,      ! Pointer to symbol pathname descriptor
;  7411     7501  2          CANDLST: REF VECTOR[,LONG],      ! Pointer to candidate vector
;  7412     7502  2          SCOPE: REF RST$ENTRY;            ! Pointer to current scope RST entry
;  7413     7503  2
;  7414     7504  2      LABEL
;  7415     7505  2          CHECK_THIS_CANDIDATE;            ! Label of block we want to LEAVE
;  7416     7506  2
;  7417     7507  2      LOCAL
;  7418     7508  2          CANDBLK: REF CAND_BLOCKVECTOR,   ! Pointer to current "candidate block"
;  7419     7509  2          COBOLGBL_FLAG,                   ! Flag set to TRUE if the COBOL Global
;  7420     7510  2                                           !     Attribute applies to this item
;  7421     7511  2          DATA_INDEX,                      ! Index into CANDBLK vector of Data Item
;  7422     7512  2                                           !     RST Entry pointer (or zero)
;  7423     7513  2          DATAQUAL_FLAG,                   ! Set to TRUE when we are in the data
;  7424     7514  2                                           !     qualification part of a name
;  7425     7515  2          DEFDEPTH,                        ! Definition depth of current candidate
;  7426     7516  2          DSTPTR: REF DST$RECORD,          ! Pointer to symbol DST record
;  7427     7517  2          GOOD_CAND,                       ! CANDLST index of best candidate so far
;  7428     7518  2          GOOD_DEFDEPTH,                   ! Definition depth of GOOD_CAND symbol
;  7429     7519  2          J,                               ! Index for CANDBLK vector
;  7430     7520  2          RSTPTR: REF RST$ENTRY,           ! Pointer to current symbol RST entry
;  7431     7521  2          SCPTR: REF RST$ENTRY,            ! Pointer used to follow current scope's
;  7432     7522  2                                           !     up-scope chain
;  7433     7523  2          SYMSCOPE: REF RST$ENTRY;         ! The actual scope of the current symbol
;  7434     7524  2
;  7435     7525  2
;  7436     7526  2
;  7437     7527  2      ! Initially we do not have a good candidate.
;  7438     7528  2      !
;  7439     7529  2      GOOD_CAND = 0;
;  7440     7530  2      GOOD_DEFDEPTH = 1000000;
;  7441     7531  2
;  7442     7532  2
;  7443     7533  2      ! Loop over all the candidate blocks on the candidate list.  This loop
;  7444     7534  2      ! searches for the best candidate symbol matching the pathname.
;  7445     7535  2      !
;  7446     7536  2      INCR I FROM 1 TO .NCANDS DO
;  7447     7537  3          BEGIN
;  7448     7538  3
;  7449     7539  3
;  7450     7540  3          ! Set up a labelled block to check out the current candidate.  We can
;  7451     7541  3          ! LEAVE this block if we find that the candidate is not acceptable.
;  7452     7542  3          !
;  7453     7543  3          CHECK_THIS_CANDIDATE:
;  7454     7544  4              BEGIN
;  7455     7545  4              CANDBLK = .CANDLST[.I];
;  7456     7546  4
;  7457     7547  4
;  7458     7548  4              ! Loop over the candidate's up-scope chain--that is what the CANDBLK
;  7459     7549  4              ! vector gives us.  Reject any candidate whose data qualification in
;  7460     7550  4              ! the up-scope chain does not agree with that in the pathname.
;  7461     7551  4              !
;  7462     7552  4              DATA_INDEX = 0;
```

```
;  7463     7553  4          COBOLGBL_FLAG = FALSE;
;  7464     7554  4          DATAQUAL_FLAG = TRUE;
;  7465     7555  4          J = 0;
;  7466     7556  4          WHILE .CANDBLK[.J, CAND_RSTPTR] NEQ 0 DO
;  7467     7557  5              BEGIN
;  7468     7558  5              RSTPTR = .CANDBLK[.J, CAND_RSTPTR];
;  7469     7559  5
;  7470     7560  5
;  7471     7561  5              ! Clear DATAQUAL_FLAG if we have left the data qualification
;  7472     7562  5              ! part of the name.
;  7473     7563  5              !
;  7474     7564  5              IF (.CANDBLK[.J, CAND_PINDEX] LSS .PATHNAME[PTH$B_PATHCNT]) AND
;  7475     7565  6                 (.CANDBLK[.J, CAND_PINDEX] NEQ 0)
;  7476     7566  5              THEN
;  7477     7567  5                  DATAQUAL_FLAG = FALSE;
;  7478     7568  5
;  7479     7569  5              IF (.RSTPTR[RST$B_KIND] NEQ RST$K_DATA) AND
;  7480     7570  6                 (.RSTPTR[RST$B_KIND] NEQ RST$K_TYPCOMP)
;  7481     7571  5              THEN
;  7482     7572  5                  DATAQUAL_FLAG = FALSE;
;  7483     7573  5
;  7484     7574  5
;  7485     7575  5              ! After we leave the data qualification part going up-scope, we
;  7486     7576  5              ! do not accept Data Items or Type Components in the name.
;  7487     7577  5              !
;  7488     7578  5              IF (NOT .DATAQUAL_FLAG)                    AND
;  7489     7579  6                 (.RSTPTR[RST$B_KIND] EQL RST$K_DATA OR
;  7490     7580  6                  .RSTPTR[RST$B_KIND] EQL RST$K_TYPCOMP)
;  7491     7581  5              THEN
;  7492     7582  5                  LEAVE CHECK_THIS_CANDIDATE;
;  7493     7583  5
;  7494     7584  5
;  7495     7585  5              ! If this is the main Data Item RST Entry in the CANDBLK up-
;  7496     7586  5              ! scope chain, save its index in DATA_INDEX.  Also set the
;  7497     7587  5              ! COBOL Global Attribute flag if the RST entry is so marked.
;  7498     7588  5              !
;  7499     7589  5              IF .RSTPTR[RST$B_KIND] EQL RST$K_DATA
;  7500     7590  5              THEN
;  7501     7591  6                  BEGIN
;  7502     7592  6                  DATA_INDEX = .J;
;  7503     7593  6                  IF .RSTPTR[RST$V_COBOLGBL] THEN COBOLGBL_FLAG = TRUE;
;  7504     7594  5                  END;
;  7505     7595  5
;  7506     7596  5
;  7507     7597  5              ! Increment the CANDBLK index and loop up-scope.
;  7508     7598  5              !
;  7509     7599  5              J = .J + 1;
;  7510     7600  4              END;
;  7511     7601  4
;  7512     7602  4
;  7513     7603  4          ! Pick up the definition depth from the last CANDBLK cell.  Reject
;  7514     7604  4          ! this candidate if we already have a candidate with a smaller def-
;  7515     7605  4          ! inition depth (i.e., defined closer to the current scope).
;  7516     7606  4          !
;  7517     7607  4          RSTPTR = .CANDBLK[.DATA_INDEX, CAND_RSTPTR];
;  7518     7608  4          DEFDEPTH = .CANDBLK[.J, CAND_PINDEX];
;  7519     7609  4          IF .DEFDEPTH GTR .GOOD_DEFDEPTH THEN LEAVE CHECK_THIS_CANDIDATE;
```

```
;  7520     7610  4
;  7521     7611  4
;  7522     7612  4                    ! Unless the COBOL "global" flag is set for this symbol, we see if
;  7523     7613  4                    ! the symbol is declared in a routine outside the current scope.
;  7524     7614  4                    ! If it is, we must reject the symbol.  In COBOL, a symbol is not
;  7525     7615  4                    ! visible in nested routines unless marked as "global".  Note that
;  7526     7616  4                    ! we skip this check if SCOPE is zero, meaning that the scope is
;  7527     7617  4                    ! the GST or all SET modules.  We also skip the check for symbols
;  7528     7618  4                    ! which are not data--these rules do not apply to routines, etc.
;  7529     7619  4                    !
;  7530     7620  4                    IF (NOT .COBOLGBL_FLAG) AND
;  7531     7621  4                       (.SCOPE NEQ 0)       AND
;  7532     7622  5                       (.RSTPTR[RST$B_KIND] EQL RST$K_DATA)
;  7533     7623  4                    THEN
;  7534     7624  5                        BEGIN
;  7535     7625  5
;  7536     7626  5
;  7537     7627  5                        ! Determine the scope in which the current symbol is declared.
;  7538     7628  5                        !
;  7539     7629  5                        SYMSCOPE = .RSTPTR;
;  7540     7630  5                        IF .RSTPTR[RST$B_KIND] NEQ RST$K_MODULE
;  7541     7631  5                        THEN
;  7542     7632  5                            SYMSCOPE = .RSTPTR[RST$L_UPSCOPEPTR];
;  7543     7633  5
;  7544     7634  5                        IF .SYMSCOPE[RST$B_KIND] EQL RST$K_TYPE
;  7545     7635  5                        THEN
;  7546     7636  5                            SYMSCOPE = .SYMSCOPE[RST$L_UPSCOPEPTR];
;  7547     7637  5
;  7548     7638  5
;  7549     7639  5                        ! See if there is a routine declaration between the current
;  7550     7640  5                        ! scope and the environment in which the symbol is declared.
;  7551     7641  5                        ! If so, reject this candidate--it is not visible from the
;  7552     7642  5                        ! current scope.
;  7553     7643  5                        !
;  7554     7644  5                        SCPTR = .SCOPE;
;  7555     7645  5                        WHILE .SCPTR NEQ .SYMSCOPE DO
;  7556     7646  6                            BEGIN
;  7557     7647  6                            IF .SCPTR[RST$B_KIND] EQL RST$K_ROUTINE
;  7558     7648  6                            THEN
;  7559     7649  6                                LEAVE CHECK_THIS_CANDIDATE;
;  7560     7650  6
;  7561     7651  6                            IF .SCPTR[RST$B_KIND] EQL RST$K_MODULE
;  7562     7652  6                            THEN
;  7563     7653  6                                $DBG_ERROR('RSTACCESS\SCOPE_RULE_COBOL');
;  7564     7654  6
;  7565     7655  6                            SCPTR = .SCPTR[RST$L_UPSCOPEPTR];
;  7566     7656  5                            END;
;  7567     7657  5
;  7568     7658  4                        END;
;  7569     7659  4
;  7570     7660  4
;  7571     7661  4                ! We have a good candidate here.  If we already have another candi-
;  7572     7662  4                ! date at the same definition depth, the symbol maybe is not unique.
;  7573     7663  4                ! We call a routine which attempts to resolve the amiguity. If it
;  7574     7664  4                ! resolves the ambiguity, then it returns the appropriate index.
;  7575     7665  4                ! It returns -1 if the reference really is amiguous.
;  7576     7666  4                !
```

```
;  7577     7667  4          IF .DEFDEPTH EQL .GOOD_DEFDEPTH
;  7578     7668  4          THEN
;  7579     7669  5              BEGIN
;  7580     7670  5              IF .GOOD_CAND EQL -1
;  7581     7671  5              THEN
;  7582     7672  5                  LEAVE CHECK_THIS_CANDIDATE;
;  7583     7673  5              GOOD_CAND = CHECK_DUPLICATE(.CANDLST, .I, .GOOD_CAND);
;  7584     7674  5              LEAVE CHECK_THIS_CANDIDATE;
;  7585     7675  4              END;
;  7586     7676  4
;  7587     7677  4
;  7588     7678  4          ! We have a good candidate which is unique (so far) at this defini-
;  7589     7679  4          ! tion depth.  Set GOOD_CAND accordingly.
;  7590     7680  4          !
;  7591     7681  4          GOOD_CAND = .I;
;  7592     7682  4          GOOD_DEFDEPTH = .DEFDEPTH;
;  7593     7683  4
;  7594     7684  3          END;                        ! End of the CHECK_THIS_CANDIDATE block
;  7595     7685  3
;  7596     7686  2      END;                            ! End of INCR loop over candidate list
;  7597     7687  2
;  7598     7688  2
;  7599     7689  2      ! Return the GOOD_CAND value.  This may be -1, 0, or a true CANDLST index.
;  7600     7690  2      !
;  7601     7691  2      RETURN .GOOD_CAND;
;  7602     7692  2
;  7603     7693  1      END;


                                                    .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0
50 4F 43 53 5C 53 53 45 43 43 41 54 53 52 1A 00546 P.AEI:  .ASCII  <26>\RSTACCESS\<92>\SCOPE_RULE_COBOL\      ;
      4C 4F 42 4F 43 5F 45 4C 55 52 5F 45 00555                                                              ;


                                                    .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                        0FFC 00000 SCOPE_RULE_COBOL:
                                                    .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10,R11        ; 7439
                                     5E       08  C2 00002          SUBL2   #8, SP                      ;
                                              59  D4 00005          CLRL    GOOD_CAND                   ; 7529
                                     5A 000F4240   8F  D0 00007          MOVL    #1000000, GOOD_DEFDEPTH     ; 7530
                                              56  D4 0000E          CLRL    I                           ; 7564
                                           00F2   31  00010 1$:     BRW     15$                         ;
                                     54    0C BC46  D0 00013 2$:     MOVL    @CANDLST[I], CANDBLK        ; 7545
                                              58  D4 00018          CLRL    DATA_INDEX                  ; 7552
                                              6E  D4 0001A          CLRL    COBOL_GBL_FLAG              ; 7553
                                  04  AE          01  D0 0001C          MOVL    #1, DATAQUAL_FLAG           ; 7554
                                              52  D4 00020          CLRL    J                           ; 7555
                                            6442  7F  00022 3$:     PUSHAQ  (CANDBLK)[J]                ; 7556
                                              9E  D5 00025          TSTL    @(SP)+                      ;
                                              50  13 00027          BEQL    8$                          ;
                                            6442  7F  00029          PUSHAQ  (CANDBLK)[J]                ; 7558
                                     53       9E  D0 0002C          MOVL    @(SP)+, RSTPTR              ;
                                           04 A442  7F  0002F          PUSHAQ  4(CANDBLK)[J]               ; 7564
```

```
                                                08 ED 00033          CMPZV   #8, #8, @PATHNAME, @(SP)+                  ;
                                                0B 15 00039          BLEQ    4$                                          ;
                                            04 A442 7F 0003B         PUSHAQ  4(CANDBLK)[J]                               ; 7565
                                                9E D5 0003F          TSTL    @(SP)+                                      ;
                                                03 13 00041          BEQL    4$                                          ;
                                            04  AE D4 00043          CLRL    DATAQUAL_FLAG                               ; 7567
                                        50  14  A3 9A 00046 4$:      MOVZBL  20(RSTPTR), R0                              ; 7569
                                        06      50 91 0004A          CMPB    R0, #6                                      ;
                                                08 13 0004D          BEQL    5$                                          ;
                                        0A      50 91 0004F          CMPB    R0, #10                                     ; 7570
                                                03 13 00052          BEQL    5$                                          ;
                                            04  AE D4 00054          CLRL    DATAQUAL_FLAG                               ; 7572
                                        0A  04  AE E8 00057 5$:      BLBS    DATAQUAL_FLAG, 6$                           ; 7578
                                        06      50 91 0005B          CMPB    R0, #6                                      ; 7579
                                                B0 13 0005E          BEQL    1$                                          ;
                                        0A      50 91 00060          CMPB    R0, #10                                     ; 7580
                                                AB 13 00063          BEQL    1$                                          ;
                                        06      50 91 00065 6$:      CMPB    R0, #6                                      ; 7589
                                                0B 12 00068          BNEQ    7$                                          ;
                                        58      52 D0 0006A          MOVL    J, DATA_INDEX                               ; 7592
                                03  15  A3      05 E1 0006D          BBC     #5, 21(RSTPTR), 7$                          ; 7593
                                        6E      01 D0 00072          MOVL    #1, COBOLGBL_FLAG                           ;
                                                52 D6 00075 7$:      INCL    J                                           ; 7599
                                                A9 11 00077          BRB     3$                                          ; 7556
                                            6448 7F 00079 8$:        PUSHAQ  (CANDBLK)[DATA_INDEX]                       ; 7607
                                        53      9E D0 0007C          MOVL    @(SP)+, RSTPTR                              ;
                                            04 A442 7F 0007F         PUSHAQ  4(CANDBLK)[J]                               ; 7608
                                        5B      9E D0 00083          MOVL    @(SP)+, DEFDEPTH                            ;
                                        5A          5B D1 00086      CMPL    DEFDEPTH, GOOD_DEFDEPTH                     ; 7609
                                                7A 14 00089          BGTR    15$                                         ;
                                        52          6E E8 0008B      BLBS    COBOLGBL_FLAG, 13$                          ; 7620
                                            10      AC D5 0008E      TSTL    SCOPE                                       ; 7621
                                                4D 13 00091          BEQL    13$                                         ;
                                        06  14      A3 91 00093      CMPB    20(RSTPTR), #6                              ; 7622
                                                47 12 00097          BNEQ    13$                                         ;
                                        57          53 D0 00099      MOVL    RSTPTR, SYMSCOPE                            ; 7629
                                        01  14      A3 91 0009C      CMPB    20(RSTPTR), #1                              ; 7630
                                                04 13 000A0          BEQL    9$                                          ;
                                        57  10      A3 D0 000A2      MOVL    16(RSTPTR), SYMSCOPE                        ; 7632
                                        07  14      A7 91 000A6 9$:  CMPB    20(SYMSCOPE), #7                            ; 7634
                                                04 12 000AA          BNEQ    10$                                         ;
                                        57  10      A7 D0 000AC      MOVL    16(SYMSCOPE), SYMSCOPE                      ; 7636
                                        55  10      AC D0 000B0 10$: MOVL    SCOPE, SCPTR                                ; 7644
                                        57          55 D1 000B4 11$: CMPL    SCPTR, SYMSCOPE                             ; 7645
                                                27 13 000B7          BEQL    13$                                         ;
                                        02  14      A5 91 000B9      CMPB    20(SCPTR), #2                               ; 7647
                                                46 13 000BD          BEQL    15$                                         ;
                                        01  14      A5 91 000BF      CMPB    20(SCPTR), #1                               ; 7651
                                                15 12 000C3          BNEQ    12$                                         ;
                                    00000000'       EF 9F 000C5      PUSHAB  P.AEI                                       ; 7653
                                                01 DD 000CB          PUSHL   #1                                          ;
                                    00028362        8F DD 000CD      PUSHL   #164706                                     ;
                                00000000G   00      03 FB 000D3      CALLS   #3, LIB$SIGNAL                              ;
                                        55      10  A5 D0 000DA 12$: MOVL    16(SCPTR), SCPTR                            ; 7655
                                                D4 11 000DE          BRB     11$                                         ; 7645
                                        5A          5B D1 000E0 13$: CMPL    DEFDEPTH, GOOD_DEFDEPTH                     ; 7667
                                                1A 12 000E3          BNEQ    14$                                         ;
```

```
                    FFFFFFFF   8F            59  D1 000E5          CMPL    GOOD_CAND, #-1                          ; 7670
                                             17  13 000EC          BEQL    15$                                     ;
                                       0240  8F  BB 000EE          PUSHR   #^M<R6,R9>                              ; 7673
                                         0C  AC  DD 000F2          PUSHL   CANDLST                                 ;
                        F4C5   CF            03  FB 000F5          CALLS   #3, CHECK_DUPLICATE                     ;
                               59            50  D0 000FA          MOVL    R0, GOOD_CAND                           ;
                                             06  11 000FD          BRB     15$                                     ; 7674
                               59            56  D0 000FF  14$:     MOVL    I, GOOD_CAND                            ; 7681
                               5A            5B  D0 00102          MOVL    DEFDEPTH, GOOD_DEFDEPTH                 ; 7682
            FF07          56               01    08  AC  F1 00105  15$:     ACBL    NCANDS, #1, I, 2$               ; 7536
                               50            59  D0 0010C          MOVL    GOOD_CAND, R0                           ; 7691
                                             04  0010F          RET                                             ; 7693

; Routine Size:  272 bytes,    Routine Base:  DBG$CODE + 3119
```

```
;  7605     7694  1 ROUTINE SCOPE_RULE_NORMAL(PATHNAME, NCANDS, CANDLST, ARRAY_FLAG) =
;  7606     7695  1 !
;  7607     7696  1 ! FUNCTION
;  7608     7697  1 !       This routine selects the symbol from a specified list of candidate sym-
;  7609     7698  1 !       bols which best matches a specified pathname.  This routine assumes
;  7610     7699  1 !       "normal" scope rules when doing so; in particular, it assumes that data
;  7611     7700  1 !       qualification must be complete (A.C is not accepted for A.B.C) or is not
;  7612     7701  1 !       present in the language.  These rules suit languages like Pascal and
;  7613     7702  1 !       Fortran.
;  7614     7703  1 !
;  7615     7704  1 !       The list of candidate symbols is produced by DBG$STA_GETSYMBOL, and each
;  7616     7705  1 !       candidate is guaranteed to be in the current scope being searched.  What
;  7617     7706  1 !       this routine must do is to determine which candidates have valid data
;  7618     7707  1 !       qualification, which candidate is defined at the lowest definition depth
;  7619     7708  1 !       (i.e., defined inner-most in the current scope), and whether that candi-
;  7620     7709  1 !       date is unique.  The routine then returns one of three things: an indi-
;  7621     7710  1 !       cation that no symbol was valid, an indication that the symbol is not
;  7622     7711  1 !       unique, or an index pointing to the one selected candidate symbol.
;  7623     7712  1 !
;  7624     7713  1 ! INPUTS
;  7625     7714  1 !       PATHNAME - Pointer to the pathname descriptor for the symbol name to
;  7626     7715  1 !                  be looked up in the symbol table.
;  7627     7716  1 !
;  7628     7717  1 !       NCANDS  - The number of candidate symbols found by DBG$STA_GETSYMBOL.
;  7629     7718  1 !
;  7630     7719  1 !       CANDLST - A vector of pointers to the "candidate blocks" for the candi-
;  7631     7720  1 !                 date symbols found by DBG$STA_GETSYMBOL.  Each of these candi-
;  7632     7721  1 !                 dates is in the scope currently searched.  The candidate block
;  7633     7722  1 !                 pointers are found in CANDLST[1] through CANDLST[.NCANDS].
;  7634     7723  1 !
;  7635     7724  1 !       ARRAY_FLAG - If true, the symbol we are looking up was seen in a
;  7636     7725  1 !                    subscripted expression. This may be used to resolve
;  7637     7726  1 !                    possible ambiguities in BASIC, where it is legal to
;  7638     7727  1 !                    have two variables of the same name, one a scalar
;  7639     7728  1 !                    and one an array.
;  7640     7729  1 !
;  7641     7730  1 ! OUTPUTS
;  7642     7731  1 !       The CANDLST index for the candidate block which best matches the path-
;  7643     7732  1 !             name is returned as the routine's value.  If no candidate is
;  7644     7733  1 !             acceptable, zero is returned, and if more than one candidate
;  7645     7734  1 !             is acceptable (the symbol is not unique), -1 is returned.
;  7646     7735  1 !
;  7647     7736  1
;  7648     7737  2     BEGIN
;  7649     7738  2
;  7650     7739  2     MAP
;  7651     7740  2         PATHNAME: REF PTH$PATHNAME,      ! Pointer to symbol pathname descriptor
;  7652     7741  2         CANDLST: REF VECTOR[,LONG];      ! Pointer to candidate vector
;  7653     7742  2
;  7654     7743  2     LABEL
;  7655     7744  2         CHECK_THIS_CANDIDATE;            ! Label of block we want to LEAVE
;  7656     7745  2
;  7657     7746  2     LOCAL
;  7658     7747  2         CANDBLK: REF CAND_BLOCKVECTOR,   ! Pointer to current "candidate block"
;  7659     7748  2         DEFDEPTH,                        ! Definition depth of current candidate
;  7660     7749  2         DSTPTR: REF DST$RECORD,          ! Pointer to symbol DST record
;  7661     7750  2         GOOD_CAND,                       ! CANDLST index of best candidate so far
```

```
;  7662     7751  2          GOOD_DEFDEPTH,                  ! Definition depth of GOOD_CAND symbol
;  7663     7752  2          J,                              ! Index for CANDBLK vector
;  7664     7753  2          RSTPTR: REF RST$ENTRY;          ! Pointer to current symbol RST entry
;  7665     7754  2
;  7666     7755  2
;  7667     7756  2
;  7668     7757  2      ! Initially we do not have a good candidate.
;  7669     7758  2      !
;  7670     7759  2      GOOD_CAND = 0;
;  7671     7760  2      GOOD_DEFDEPTH = 1000000;
;  7672     7761  2
;  7673     7762  2
;  7674     7763  2      ! Loop over all the candidate blocks on the candidate list.  This loop
;  7675     7764  2      ! searches for the best candidate symbol matching the pathname.
;  7676     7765  2      !
;  7677     7766  2      INCR I FROM 1 TO .NCANDS DO
;  7678     7767  3          BEGIN
;  7679     7768  3
;  7680     7769  3
;  7681     7770  3          ! Set up a labelled block to check out the current candidate.  We can
;  7682     7771  3          ! LEAVE this block if we find that the candidate is not acceptable.
;  7683     7772  3          !
;  7684     7773  3          CHECK_THIS_CANDIDATE:
;  7685     7774  4              BEGIN
;  7686     7775  4              CANDBLK = .CANDLST[.I];
;  7687     7776  4
;  7688     7777  4
;  7689     7778  4              ! Loop over the candidate's up-scope chain--that is what the CANDBLK
;  7690     7779  4              ! vector gives us.  Reject any candidate whose data qualification in
;  7691     7780  4              ! the up-scope chain does not agree with that in the pathname.
;  7692     7781  4              !
;  7693     7782  4              J = 0;
;  7694     7783  4              WHILE .CANDBLK[.J, CAND_RSTPTR] NEQ 0 DO
;  7695     7784  5                  BEGIN
;  7696     7785  5                  RSTPTR = .CANDBLK[.J, CAND_RSTPTR];
;  7697     7786  5
;  7698     7787  5
;  7699     7788  5                  ! No item before a backslash and no item not explicitly given
;  7700     7789  5                  ! in the Pathname Descriptor may be a Data Item or Type Compo-
;  7701     7790  5                  ! nent.  This ensures complete data qualification when present.
;  7702     7791  5                  !
;  7703     7792  6                  IF (.CANDBLK[.J, CAND_PINDEX] LSS .PATHNAME[PTH$B_PATHCNT] OR
;  7704     7793  5                      .CANDBLK[.J, CAND_PINDEX] EQL 0)                          AND
;  7705     7794  6                     (.RSTPTR[RST$B_KIND] EQL RST$K_DATA OR
;  7706     7795  6                      .RSTPTR[RST$B_KIND] EQL RST$K_TYPCOMP)
;  7707     7796  5                  THEN
;  7708     7797  5                      LEAVE CHECK_THIS_CANDIDATE;
;  7709     7798  5
;  7710     7799  5
;  7711     7800  5                  ! No item immediately before the first dot (i.e., X in A\X or
;  7712     7801  5                  ! A\X.B) may be a Type Component and, if there are record com-
;  7713     7802  5                  ! ponents, that item must be a Data item.  Again, this ensures
;  7714     7803  5                  ! that data qualification is complete.
;  7715     7804  5                  !
;  7716     7805  5                  IF (.CANDBLK[.J, CAND_PINDEX] EQL .PATHNAME[PTH$B_PATHCNT]) AND
;  7717     7806  6                     ((.RSTPTR[RST$B_KIND] EQL RST$K_TYPCOMP) OR
;  7718     7807  7                      (.PATHNAME[PTH$B_TOTCNT] GTR .PATHNAME[PTH$B_PATHCNT] AND
```

```
;  7719     7808  6                .RSTPTR[RST$B_KIND] NEQ RST$K_DATA))
;  7720     7809  5            THEN
;  7721     7810  5                LEAVE CHECK_THIS_CANDIDATE;
;  7722     7811  5
;  7723     7812  5
;  7724     7813  5            ! If this item is part of the data qualification, it must be a
;  7725     7814  5            ! Type Component.
;  7726     7815  5            !
;  7727     7816  5            IF (.CANDBLK[.J, CAND_PINDEX] GTR .PATHNAME[PTH$B_PATHCNT]) AND
;  7728     7817  6               (.RSTPTR[RST$B_KIND] NEQ RST$K_TYPCOMP)
;  7729     7818  5            THEN
;  7730     7819  5                LEAVE CHECK_THIS_CANDIDATE;
;  7731     7820  5
;  7732     7821  5
;  7733     7822  5            ! Increment the CANDBLK index and loop up-scope.
;  7734     7823  5            !
;  7735     7824  5            J = .J + 1;
;  7736     7825  4            END;
;  7737     7826  4
;  7738     7827  4        ! Pick up the definition depth from the last CANDBLK cell.  Reject
;  7739     7828  4        ! this candidate if we already have a candidate with a smaller def-
;  7740     7829  4        ! inition depth (i.e., defined closer to the current scope).
;  7741     7830  4        !
;  7742     7831  4        DEFDEPTH = .CANDBLK[.J, CAND_PINDEX];
;  7743     7832  4        IF .DEFDEPTH GTR .GOOD_DEFDEPTH THEN LEAVE CHECK_THIS_CANDIDATE;
;  7744     7833  4
;  7745     7834  4
;  7746     7835  4        ! We have a good candidate here.  If we already have another candi-
;  7747     7836  4        ! date at the same definition depth, the symbol maybe is not unique.
;  7748     7837  4        ! We call a routine which attempts to resolve the amiguity. If it
;  7749     7838  4        ! resolves the ambiguity, then it returns the appropriate index.
;  7750     7839  4        ! It returns -1 if the reference really is ambiguous.
;  7751     7840  4        !
;  7752     7841  4        IF .DEFDEPTH EQL .GOOD_DEFDEPTH
;  7753     7842  4        THEN
;  7754     7843  4            BEGIN
;  7755     7844  5            IF .GOOD_CAND EQL -1
;  7756     7845  5            THEN
;  7757     7846  5                LEAVE CHECK_THIS_CANDIDATE;
;  7758     7847  5            GOOD_CAND = CHECK_DUPLICATE(.CANDLST, .I,
;  7759     7848  5                                        .GOOD_CAND, .ARRAY_FLAG);
;  7760     7849  5            LEAVE CHECK_THIS_CANDIDATE;
;  7761     7850  5            END;
;  7762     7851  4
;  7763     7852  4
;  7764     7853  4        ! We have a good candidate which is unique (so far) at this defini-
;  7765     7854  4        ! tion depth.  Set GOOD_CAND accordingly.
;  7766     7855  4        !
;  7767     7856  4        GOOD_CAND = .I;
;  7768     7857  4        GOOD_DEFDEPTH = .DEFDEPTH;
;  7769     7858  4
;  7770     7859  4
;  7771     7860  3        END;                            ! End of the CHECK_THIS_CANDIDATE block
;  7772     7861  3
;  7773     7862  2    END;                                ! End of INCR loop over candidate list
;  7774     7863  2
;  7775     7864  2
```

```
;  7776          7865  2     ! Return the GOOD_CAND value.  This may be -1, 0, or a true CANDLST index.
;  7777          7866  2     !
;  7778          7867  2     RETURN .GOOD_CAND;
;  7779          7868  2
;  7780          7869  1     END;


                                                01FC 00000 SCOPE_RULE_NORMAL:
                                                           .WORD   Save R2,R3,R4,R5,R6,R7,R8                    ; 7694
                                          50  D4 00002              CLRL    GOOD_CAND                           ; 7759
                                 56 000F4240  8F  D0 00004          MOVL    #1000000, GOOD_DEFDEPTH             ; 7760
                                          54  D4 00008              CLRL    I                                   ; 7792
                                        0093  31 0000D              BRW     9$                                  ;
                                          55 0C BC44  D0 00010 1$:  MOVL    @CANDLST[I], CANDBLK                ; 7775
                                          52  D4 00015              CLRL    J                                   ; 7782
                                        6542  7F 00017 2$:         PUSHAQ  (CANDBLK)[J]                        ; 7783
                                          9E  D5 0001A              TSTL    @(SP)+                              ;
                                          57  13 0001C              BEQL    7$                                  ;
                                        6542  7F 0001E              PUSHAQ  (CANDBLK)[J]                        ; 7785
                                          53  9E  D0 00021          MOVL    @(SP)+, RSTPTR                      ;
                                       04 A542  7F 00024          PUSHAQ  4(CANDBLK)[J]                       ; 7792
                                          51  9E  D0 00028          MOVL    @(SP)+, R1                          ;
51        04    BC                        08  ED 0002B              CMPZV   #8, #8, @PATHNAME, R1               ;
                                          04  14 00031              BGTR    3$                                  ;
                                          51  D5 00033              TSTL    R1                                  ; 7793
                                          0C  12 00035              BNEQ    4$                                  ;
                                    06    14  A3  91 00037 3$:      CMPB    20(RSTPTR), #6                      ; 7794
                                          66  13 0003B              BEQL    9$                                  ;
                                    0A    14  A3  91 0003D          CMPB    20(RSTPTR), #10                     ; 7795
                                          60  13 00041              BEQL    9$                                  ;
51        04    BC                        08  ED 00043 4$:         CMPZV   #8, #8, @PATHNAME, R1               ; 7805
                                          18  12 00049              BNEQ    5$                                  ;
                                    0A    14  A3  91 0004B          CMPB    20(RSTPTR), #10                     ; 7806
                                          52  13 0004F              BEQL    9$                                  ;
                                    58    04  BC  9A 00051          MOVZBL  @PATHNAME, R8                       ; 7807
58        04    BC                        08  ED 00055              CMPZV   #8, #8, @PATHNAME, R8               ;
                                          06  18 0005B              BGEQ    5$                                  ;
                                    06    14  A3  91 0005D          CMPB    20(RSTPTR), #6                      ; 7808
                                          40  12 00061              BNEQ    9$                                  ;
51        04    BC                        08  ED 00063 5$:         CMPZV   #8, #8, @PATHNAME, R1               ; 7816
                                          06  18 00069              BGEQ    6$                                  ;
                                    0A    14  A3  91 0006B          CMPB    20(RSTPTR), #10                     ; 7817
                                          32  12 0006F              BNEQ    9$                                  ;
                                          52  D6 00071 6$:         INCL    J                                   ; 7824
                                          A2  11 00073              BRB     2$                                  ; 7783
                                       04 A542  7F 00075 7$:         PUSHAQ  4(CANDBLK)[J]                       ; 7832
                                    57    9E  D0 00079              MOVL    @(SP)+, DEFDEPTH                    ;
                                    56    57  D1 0007C              CMPL    DEFDEPTH, GOOD_DEFDEPTH             ; 7833
                                          22  14 0007F              BGTR    9$                                  ;
                                          1A  12 00081              BNEQ    8$                                  ; 7842
                FFFFFFFF    8F            50  D1 00083              CMPL    GOOD_CAND, #-1                      ; 7845
                                          17  13 0008A              BEQL    9$                                  ;
                                    10    AC  DD 0008C              PUSHL   ARRAY_FLAG                          ; 7849
                                          50  DD 0008F              PUSHL   GOOD_CAND
```

```
                                54  DD 00091          PUSHL   I                                       ; 7848
                            0C  AC  DD 00093          PUSHL   CANDLST                                 ;
                    F414    CF      04  FB 00096      CALLS   #4, CHECK_DUPLICATE                     ;
                                    06  11 0009B      BRB     9$                                      ; 7850
                        50          54  D0 0009D 8$:  MOVL    I, GOOD_CAND                            ; 7857
                        56          57  D0 000A0      MOVL    DEFDEPTH, GOOD_DEFDEPTH                 ; 7858
        FF66        54              01      08  AC  F1 000A3 9$:  ACBL    NCANDS, #1, I, 1$           ; 7766
                                                    04 000AA      RET                                     ; 7869

; Routine Size:  171 bytes,    Routine Base:  DBG$CODE + 3229
```

```
;  7782     7870  1 ROUTINE SCOPE_RULE_PLI(PATHNAME, NCANDS, CANDLST) =
;  7783     7871  1 !
;  7784     7872  1 ! FUNCTION
;  7785     7873  1 !       This routine selects the symbol from a specified list of candidate sym-
;  7786     7874  1 !       bols which best matches a specified pathname.  This routine assumes
;  7787     7875  1 !       PL/I scope rules when doing so.  This means that incomplete data quali-
;  7788     7876  1 !       fication is accepted, and that uniqueness is determined by these rules:
;  7789     7877  1 !
;  7790     7878  1 !           (1) By definition, the "lowest definition depth" is the
;  7791     7879  1 !               inner-most definition depth in the current scope at
;  7792     7880  1 !               which at least one candidate symbol is declared.
;  7793     7881  1 !
;  7794     7882  1 !           (2) If only one candidate symbol is defined at the lowest
;  7795     7883  1 !               definition depth, then that is the unique symbol we
;  7796     7884  1 !               want.
;  7797     7885  1 !
;  7798     7886  1 !           (3) If more than one symbol is defined at the lowest defi-
;  7799     7887  1 !               nition depth, but only one of them has complete data
;  7800     7888  1 !               qualification, then that is the unique symbol we want.
;  7801     7889  1 !
;  7802     7890  1 !           (4) Otherwise, the symbol is not unique.
;  7803     7891  1 !
;  7804     7892  1 !       The list of candidate symbols is produced by DBG$STA_GETSYMBOL, and each
;  7805     7893  1 !       candidate is guaranteed to be in the current scope being searched.  What
;  7806     7894  1 !       this routine must do is to determine which candidates have valid data
;  7807     7895  1 !       qualification, which candidate is defined at the lowest definition depth
;  7808     7896  1 !       (i.e., defined inner-most in the current scope), and whether that candi-
;  7809     7897  1 !       date is unique.  The routine then returns one of three things: an indi-
;  7810     7898  1 !       cation that no symbol was valid, an indication that the symbol is not
;  7811     7899  1 !       unique, or an index pointing to the one selected candidate symbol.
;  7812     7900  1 !
;  7813     7901  1 ! INPUTS
;  7814     7902  1 !       PATHNAME - Pointer to the pathname descriptor for the symbol name to
;  7815     7903  1 !                  be looked up in the symbol table.
;  7816     7904  1 !
;  7817     7905  1 !       NCANDS  - The number of candidate symbols found by DBG$STA_GETSYMBOL.
;  7818     7906  1 !
;  7819     7907  1 !       CANDLST - A vector of pointers to the "candidate blocks" for the candi-
;  7820     7908  1 !                 date symbols found by DBG$STA_GETSYMBOL.  Each of these candi-
;  7821     7909  1 !                 dates is in the scope currently searched.  The candidate block
;  7822     7910  1 !                 pointers are found in CANDLST[1] through CANDLST[.NCANDS].
;  7823     7911  1 !
;  7824     7912  1 ! OUTPUTS
;  7825     7913  1 !       The CANDLST index for the candidate block which best matches the path-
;  7826     7914  1 !                 name is returned as the routine's value.  If no candidate is
;  7827     7915  1 !                 acceptable, zero is returned, and if more than one candidate
;  7828     7916  1 !                 is acceptable (the symbol is not unique), -1 is returned.
;  7829     7917  1 !
;  7830     7918  1
;  7831     7919  2     BEGIN
;  7832     7920  2
;  7833     7921  2     MAP
;  7834     7922  2         PATHNAME: REF PTH$PATHNAME,      ! Pointer to symbol pathname descriptor
;  7835     7923  2         CANDLST: REF VECTOR[,LONG];      ! Pointer to candidate vector
;  7836     7924  2
;  7837     7925  2     LABEL
;  7838     7926  2         CHECK_THIS_CANDIDATE;            ! Label of block we want to LEAVE
```

```
;  7839     7927  2
;  7840     7928  2     LOCAL
;  7841     7929  2         CANDBLK: REF CAND_BLOCKVECTOR,      ! Pointer to current "candidate block"
;  7842     7930  2         COMPLETE_FLAG,                      ! Set to TRUE if current candidate's
;  7843     7931  2                                             !     data qualification is complete
;  7844     7932  2         DATAQUAL_FLAG,                      ! Set to TRUE when we are in the data
;  7845     7933  2                                             !     qualification part of a name
;  7846     7934  2         DEFDEPTH,                           ! Definition depth of current candidate
;  7847     7935  2         DSTPTR: REF DST$RECORD,             ! Pointer to symbol DST record
;  7848     7936  2         GOOD_CAND,                          ! CANDLST index of best candidate so far
;  7849     7937  2         GOOD_COMPLETE_FLAG,                 ! Complete-data-qualification flag for
;  7850     7938  2                                             !     the GOOD_CAND symbol
;  7851     7939  2         GOOD_DEFDEPTH,                      ! Definition depth of GOOD_CAND symbol
;  7852     7940  2         J,                                  ! Index for CANDBLK vector
;  7853     7941  2         RSTPTR: REF RST$ENTRY;              ! Pointer to current symbol RST entry
;  7854     7942  2
;  7855     7943  2
;  7856     7944  2
;  7857     7945  2     ! Initially we do not have a good candidate.
;  7858     7946  2     !
;  7859     7947  2     GOOD_CAND = 0;
;  7860     7948  2     GOOD_DEFDEPTH = 1000000;
;  7861     7949  2     GOOD_COMPLETE_FLAG = FALSE;
;  7862     7950  2
;  7863     7951  2
;  7864     7952  2     ! Loop over all the candidate blocks on the candidate list.  This loop
;  7865     7953  2     ! searches for the best candidate symbol matching the pathname.
;  7866     7954  2     !
;  7867     7955  2     INCR I FROM 1 TO .NCANDS DO
;  7868     7956  3         BEGIN
;  7869     7957  3
;  7870     7958  3
;  7871     7959  3         ! Set up a labelled block to check out the current candidate.  We can
;  7872     7960  3         ! LEAVE this block if we find that the candidate is not acceptable.
;  7873     7961  3         !
;  7874     7962  3         CHECK_THIS_CANDIDATE:
;  7875     7963  4             BEGIN
;  7876     7964  4             CANDBLK = .CANDLST[.I];
;  7877     7965  4             COMPLETE_FLAG = TRUE;
;  7878     7966  4
;  7879     7967  4
;  7880     7968  4             ! Loop over the candidate's up-scope chain--that is what the CANDBLK
;  7881     7969  4             ! vector gives us.  Reject any candidate whose data qualification in
;  7882     7970  4             ! the up-scope chain does not agree with that in the pathname.
;  7883     7971  4             !
;  7884     7972  4             DATAQUAL_FLAG = TRUE;
;  7885     7973  4             J = 0;
;  7886     7974  4             WHILE .CANDBLK[.J, CAND_RSTPTR] NEQ 0 DO
;  7887     7975  5                 BEGIN
;  7888     7976  5                 RSTPTR = .CANDBLK[.J, CAND_RSTPTR];
;  7889     7977  5
;  7890     7978  5
;  7891     7979  5                 ! Clear DATAQUAL_FLAG if we have left the data qualification
;  7892     7980  5                 ! part of the name.
;  7893     7981  5                 !
;  7894     7982  5                 IF (.CANDBLK[.J, CAND_PINDEX] LSS .PATHNAME[PTH$B_PATHCNT]) AND
;  7895     7983  6                    (.CANDBLK[.J, CAND_PINDEX] NEQ 0)
```

```
;  7896          7984  5                THEN
;  7897          7985  5                    DATAQUAL_FLAG = FALSE;
;  7898          7986  5
;  7899          7987  5
;  7900          7988  5                ! After we leave the data qualification part going up-scope, we
;  7901          7989  5                ! do not accept Data Items or Type Components in the name.
;  7902          7990  5                !
;  7903          7991  5                IF (NOT .DATAQUAL_FLAG)                    AND
;  7904          7992  6                   (.RSTPTR[RST$B_KIND] EQL RST$K_DATA OR
;  7905          7993  6                    .RSTPTR[RST$B_KIND] EQL RST$K_TYPCOMP)
;  7906          7994  5                THEN
;  7907          7995  5                    LEAVE CHECK_THIS_CANDIDATE;
;  7908          7996  5
;  7909          7997  5                ! The last thing before the dot when there are things after the
;  7910          7998  5                ! dot must be a Data Item or Type Component.
;  7911          7999  5                !
;  7912          8000  5                IF (.CANDBLK[.J, CAND_PINDEX] EQL .PATHNAME[PTH$B_PATHCNT]) AND
;  7913          8001  5                   (.PATHNAME[PTH$B_TOTCNT] GTR .PATHNAME[PTH$B_PATHCNT])   AND
;  7914          8002  5                   (.RSTPTR[RST$B_KIND] NEQ RST$K_DATA)                     AND
;  7915          8003  5                   (.RSTPTR[RST$B_KIND] NEQ RST$K_TYPCOMP)
;  7916          8004  6                THEN
;  7917          8005  5                    LEAVE CHECK_THIS_CANDIDATE;
;  7918          8006  5
;  7919          8007  5                ! After the dot, everything must be Type Components.
;  7920          8008  5                !
;  7921          8009  5                IF (.CANDBLK[.J, CAND_PINDEX] GTR .PATHNAME[PTH$B_PATHCNT]) AND
;  7922          8010  5                   (.RSTPTR[RST$B_KIND] NEQ RST$K_TYPCOMP)
;  7923          8011  5                THEN
;  7924          8012  6                    LEAVE CHECK_THIS_CANDIDATE;
;  7925          8013  5
;  7926          8014  5                    ! If we are in the data qualification part and PINDEX is zero,
;  7927          8015  5                    ! we have an RST entry on the up-scope chain whose name is not
;  7928          8016  5                    ! given in the Pathname Descriptor.  This means that data quali-
;  7929          8017  5                    ! fication is not complete for this variable.
;  7930          8018  5                    !
;  7931          8019  5                    IF .DATAQUAL_FLAG AND (.CANDBLK[.J, CAND_PINDEX] EQL 0)
;  7932          8020  5                    THEN
;  7933          8021  5                        COMPLETE_FLAG = FALSE;
;  7934          8022  6                    ;
;  7935          8023  5                    ! Increment the CANDBLK index and loop up-scope.
;  7936          8024  5                    !
;  7937          8025  5                    J = .J + 1;
;  7938          8026  5                    END;
;  7939          8027  5
;  7940          8028  5                ! Pick up the definition depth from the last CANDBLK cell.  Reject
;  7941          8029  5                ! this candidate if we already have a candidate with a smaller def-
;  7942          8030  4                ! inition depth (i.e., defined closer to the current scope).
;  7943          8031  4                !
;  7944          8032  4                DEFDEPTH = .CANDBLK[.J, CAND_PINDEX];
;  7945          8033  4                IF .DEFDEPTH GTR .GOOD_DEFDEPTH THEN LEAVE CHECK_THIS_CANDIDATE;
;  7946          8034  4
;  7947          8035  4
;  7948          8036  4
;  7949          8037  4
;  7950          8038  4
;  7951          8039  4
;  7952          8040  4
```

```
;  7953          8041  4          ! We have a good candidate here.  If we already have another candi-
;  7954          8042  4          ! date at the same definition depth, the symbol maybe is not unique.
;  7955          8043  4          ! If only one of the two candidates has complete data qualification,
;  7956          8044  4          ! we accept that one candidate as being the one we want (so far).
;  7957          8045  4          ! Otherwise, we call a routine which attempts to resolve the amiguity. If it
;  7958          8046  4          ! resolves the ambiguity, then it returns the appropriate index.
;  7959          8047  4          ! It returns -1 if the reference really is amiguous.
;  7960          8048  4          !
;  7961          8049  4          IF (.DEFDEPTH EQL .GOOD_DEFDEPTH) AND
;  7962          8050  5             (.GOOD_COMPLETE_FLAG OR NOT .COMPLETE_FLAG)
;  7963          8051  4          THEN
;  7964          8052  5              BEGIN
;  7965          8053  6              IF (.COMPLETE_FLAG OR NOT .GOOD_COMPLETE_FLAG)
;  7966          8054  5              THEN
;  7967          8055  6                  BEGIN
;  7968          8056  6                  IF .GOOD_CAND EQL -1
;  7969          8057  6                  THEN
;  7970          8058  6                      LEAVE CHECK_THIS_CANDIDATE;
;  7971          8059  6                  GOOD_CAND = CHECK_DUPLICATE(.CANDLST, .I, .GOOD_CAND);
;  7972          8060  6                  IF .GOOD_CAND EQL .I
;  7973          8061  6                  THEN
;  7974          8062  6                      GOOD_COMPLETE_FLAG = .COMPLETE_FLAG;
;  7975          8063  5                  END;
;  7976          8064  5              LEAVE CHECK_THIS_CANDIDATE;
;  7977          8065  4              END;
;  7978          8066  4
;  7979          8067  4
;  7980          8068  4          ! We have a good candidate which is unique (so far) at this defini-
;  7981          8069  4          ! tion depth.  Set GOOD_CAND accordingly.
;  7982          8070  4          !
;  7983          8071  4          GOOD_CAND = .I;
;  7984          8072  4          GOOD_DEFDEPTH = .DEFDEPTH;
;  7985          8073  4          GOOD_COMPLETE_FLAG = .COMPLETE_FLAG;
;  7986          8074  4
;  7987          8075  3          END;                        ! End of the CHECK_THIS_CANDIDATE block
;  7988          8076  3
;  7989          8077  2      END;                            ! End of INCR loop over candidate list
;  7990          8078  2
;  7991          8079  2
;  7992          8080  2      ! Return the GOOD_CAND value.  This may be -1, 0, or a true CANDLST index.
;  7993          8081  2      !
;  7994          8082  2      RETURN .GOOD_CAND;
;  7995          8083  2
;  7996          8084  1      END;


                                        0FFC 00000 SCOPE_RULE_PLI:
                                                           .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10,R11          ; 7870
                                             50   D4 00002        CLRL    GOOD_CAND                             ; 7947
                                 58 000F4240   8F   D0 00004        MOVL    #1000000, GOOD_DEFDEPTH               ; 7948
                                             57   D4 00008        CLRL    GOOD_COMPLETE_FLAG                    ; 7949
                                             54   D4 0000D        CLRL    I                                     ; 7982
                                          00B8   31 0000F 1$:     BRW     14$                                   ;
                                 55       0C BC44   D0 00012 2$:  MOVL    @CANDLST[I], CANDBLK                  ; 7964
```

```
                                56              01  D0 00017          MOVL    #1, COMPLETE_FLAG                       ; 7965
                                5A              01  D0 0001A          MOVL    #1, DATAQUAL_FLAG                       ; 7972
                                52              D4  0001D          CLRL    J                                       ; 7973
                                            6542 7F  0001F 3$:     PUSHAQ  (CANDBLK)[J]                            ; 7974
                                               9E  D5  00022       TSTL    @(SP)+
                                               65  13  00024       BEQL    9$
                                            6542 7F  00026         PUSHAQ  (CANDBLK)[J]                            ; 7976
                                53             9E  D0  00029       MOVL    @(SP)+, RSTPTR
                                         04 A542 7F  0002C         PUSHAQ  4(CANDBLK)[J]                           ; 7982
                                51             9E  D0  00030       MOVL    @(SP)+, R1
        51      04      BC      08             08  ED  00033       CMPZV   #8, #8, @PATHNAME, R1
                                               06  15  00039       BLEQ    4$
                                               51  D5  0003B       TSTL    R1                                      ; 7983
                                               02  13  0003D       BEQL    4$
                                               5A  D4  0003F       CLRL    DATAQUAL_FLAG                           ; 7985
                                0C             5A  E8  00041 4$:     BLBS    DATAQUAL_FLAG, 5$                       ; 7991
                                06          14 A3  91  00044       CMPB    20(RSTPTR), #6                          ; 7992
                                               C5  13  00048       BEQL    1$
                                0A          14 A3  91  0004A       CMPB    20(RSTPTR), #10                         ; 7993
                                               7A  13  0004E       BEQL    14$
        51      04      BC      08             08  ED  00050 5$:     CMPZV   #8, #8, @PATHNAME, R1                   ; 8001
                                               18  12  00056       BNEQ    6$
                                5B          04 BC  9A  00058       MOVZBL  @PATHNAME, R11                          ; 8002
        5B      04      BC      08             08  ED  0005C       CMPZV   #8, #8, @PATHNAME, R11
                                               0C  18  00062       BGEQ    6$
                                06          14 A3  91  00064       CMPB    20(RSTPTR), #6                          ; 8003
                                               06  13  00068       BEQL    6$
                                0A          14 A3  91  0006A       CMPB    20(RSTPTR), #10                         ; 8004
                                               5A  12  0006E       BNEQ    14$
        51      04      BC      08             08  ED  00070 6$:     CMPZV   #8, #8, @PATHNAME, R1                   ; 8011
                                               06  18  00076       BGEQ    7$
                                0A          14 A3  91  00078       CMPB    20(RSTPTR), #10                         ; 8012
                                               4C  12  0007C       BNEQ    14$
                                06             5A  E9  0007E 7$:     BLBC    DATAQUAL_FLAG, 8$                       ; 8022
                                               51  D5  00081       TSTL    R1
                                               02  12  00083       BNEQ    8$
                                               56  D4  00085       CLRL    COMPLETE_FLAG                           ; 8024
                                               52  D6  00087 8$:     INCL    J                                       ; 8029
                                               94  11  00089       BRB     3$                                      ; 7974
                                         04 A542 7F  0008B 9$:     PUSHAQ  4(CANDBLK)[J]                           ; 8037
                                59             9E  D0  0008F       MOVL    @(SP)+, DEFDEPTH
                                58             59  D1  00092       CMPL    DEFDEPTH, GOOD_DEFDEPTH                 ; 8038
                                               33  14  00095       BGTR    14$
                                               28  12  00097       BNEQ    12$                                     ; 8049
                                03             57  E8  00099       BLBS    GOOD_COMPLETE_FLAG, 10$                 ; 8050
                                22             56  E8  0009C       BLBS    COMPLETE_FLAG, 12$
                                03             56  E8  0009F 10$:     BLBS    COMPLETE_FLAG, 11$                      ; 8053
                                25             57  E8  000A2       BLBS    GOOD_COMPLETE_FLAG, 14$
    FFFFFFFF    8F                             50  D1  000A5 11$:     CMPL    GOOD_CAND, #-1                          ; 8056
                                               1C  13  000AC       BEQL    14$
                                               50  DD  000AE       PUSHL   GOOD_CAND                               ; 8059
                                               54  DD  000B0       PUSHL   I
                                         0C    AC  DD  000B2       PUSHL   CANDLST
            F34A    CF                         03  FB  000B5       CALLS   #3, CHECK_DUPLICATE
                                54             50  D1  000BA       CMPL    GOOD_CAND, I                            ; 8060
                                               0B  12  000BD       BNEQ    14$
                                               06  11  000BF       BRB     13$                                     ; 8062
```

```
                50          54  DO 000C1 12$:   MOVL    I, GOOD_CAND                        ; 8071
                58          59  DO 000C4        MOVL    DEFDEPTH, GOOD_DEFDEPTH             ; 8072
                57          56  DO 000C7 13$:   MOVL    COMPLETE_FLAG, GOOD_COMPLETE_FLAG   ; 8073
      FF41            54    01    08  AC  F1 000CA 14$:   ACBL    NCANDS, #1, I, 2$           ; 7955
                                        04 000D1        RET                                 ; 8084

; Routine Size:  210 bytes,    Routine Base:  DBG$CODE + 32D4
```

```
;  7998     8085  1 ROUTINE SETCONTEXT_ERROR_HANDLER (SIGARG, MECHARG, ENBLARG) =
;  7999     8086  1 !
;  8000     8087  1 ! FUNCTION
;  8001     8088  1 !       This routine is the error handler for the DBG$STA_SETCONTEXT  routine.
;  8002     8089  1 !       It handles Access Violations which occur during the following of stack
;  8003     8090  1 !       call frames.  Since such access violations are not normally caused by
;  8004     8091  1 !       errors in Debug but rather by errors in the user program (e.g., by
;  8005     8092  1 !       clobbered FP), we give a special message for this kind of access
;  8006     8093  1 !       violation.
;  8007     8094  1 !       The message says that there is a bad frame pointer or call frame in
;  8008     8095  1 !       the stack.
;  8009     8096  1 !
;  8010     8097  1 ! INPUTS
;  8011     8098  1 !       SIGARG  - The signal argument vector.
;  8012     8099  1 !
;  8013     8100  1 !       MECHARG - The mechanism argument vector.
;  8014     8101  1 !
;  8015     8102  1 !       ENBLARG - The enable argument vector (not used here).
;  8016     8103  1 !
;  8017     8104  1 ! OUTPUTS
;  8018     8105  1 !       For the SS$_ACCVIO error, the DBG$_BADFRAME informational message is
;  8019     8106  1 !       signaled, and the stack is unwound to leave DBG$STA_SETCONTEXT.
;  8020     8107  1 !       For all other errors, this routine just resignals.
;  8021     8108  1 !
;  8022     8109  1
;  8023     8110  2     BEGIN
;  8024     8111  2
;  8025     8112  2     MAP
;  8026     8113  2         SIGARG: REF VECTOR[,LONG];      ! Pointer to the signal argument vector
;  8027     8114  2
;  8028     8115  2
;  8029     8116  2     ! If this is anything other than an access violation, just resignal it.
;  8030     8117  2     !
;  8031     8118  2     IF .SIGARG[1] NEQ SS$_ACCVIO THEN RETURN SS$_RESIGNAL;
;  8032     8119  2
;  8033     8120  2
;  8034     8121  2     ! It is an access violation.  Signal the informational and unwind.
;  8035     8122  2     !
;  8036     8123  2     SIGNAL (DBG$_BADFRAME);
;  8037     8124  2     SETUNWIND ();
;  8038     8125  2     RETURN 0;
;  8039     8126  2
;  8040     8127  1     END;


                                0000 00000 SETCONTEXT_ERROR_HANDLER:
                                           .WORD   Save nothing                          ; 8085
                50        04    AC  D0 00002       MOVL    SIGARG, R0                   ; 8118
                0C        04    A0  D1 00006       CMPL    4(R0), #12                   ;
                                  06  13 0000A       BEQL    1$                           ;
                50      0918    8F  3C 0000C       MOVZWL  #2328, R0                    ;
                                  04  00011       RET                                  ;
                    00028693    8F  DD 00012 1$:   PUSHL   #165523                      ; 8123
00000000G       00              01  FB 00018       CALLS   #1, LIB$SIGNAL               ;
```

```
                                7E  7C 0001F          CLRQ    -(SP)                                   ; 8124
                    00000000G   00  02  FB 00021      CALLS   #2, SYS$UNWIND                          ;
                                50  D4 00028          CLRL    R0                                      ; 8125
                                    04 0002A          RET                                             ; 8127

; Routine Size:  43 bytes,    Routine Base:  DBG$CODE + 33A6
```

```
;  8042          8128  1 ROUTINE STACK_MACHINE(STK_CODE_PTR, RESULT_PTR, FRAMEPTR): NOVALUE =
;  8043          8129  1 !
;  8044          8130  1 ! FUNCTION
;  8045          8131  1 !       This routine evaluates "Stack Machine" code from a Materialization Spec
;  8046          8132  1 !       in a DST Value Spec.  It accepts as input a pointer to the Stack Machine
;  8047          8133  1 !       "routine" (i.e., the "code") to be evaluated.  That "routine" is then
;  8048          8134  1 !       evaluated on a stack built in a temporary memory block.  Upon return,
;  8049          8135  1 !       the address of the computed value in the temporary memory block is
;  8050          8136  1 !       returned as the result of the evaluation.
;  8051          8137  1 !
;  8052          8138  1 ! INPUTS
;  8053          8139  1 !       STK_CODE_PTR - The address of the first byte of "Stack Machine" code.
;  8054          8140  1 !                      Evaluation of this "code" starts at this address and con-
;  8055          8141  1 !                      tinues until the DST$K_STK_STOP command is reached.
;  8056          8142  1 !
;  8057          8143  1 !       RESULT_PTR - The address of a longword location to receive the result
;  8058          8144  1 !                    pointer.
;  8059          8145  1 !
;  8060          8146  1 !       FRAMEPTR - The address of a longword location to receive the frame
;  8061          8147  1 !                  pointer associated with the result location.
;  8062          8148  1 !
;  8063          8149  1 ! OUTPUTS
;  8064          8150  1 !       RESULT_PTR - A pointer to the result of evaluating the stack machine
;  8065          8151  1 !                    routine is returned to RESULT_PTR.
;  8066          8152  1 !
;  8067          8153  1 !       FRAMEPTR - The Frame Pointer (FP) value of the register set used in
;  8068          8154  1 !                  the stack machine computations is returned to FRAMEPTR if
;  8069          8155  1 !                  any register was used in the computations.  If no register
;  8070          8156  1 !                  value was used, zero is returned to FRAMEPTR.
;  8071          8157  1 !
;  8072          8158  1 !       No value is returned by routine STACK_MACHINE.
;  8073          8159  1 !
;  8074          8160  1
;  8075          8161  2     BEGIN
;  8076          8162  2
;  8077          8163  2     MAP
;  8078          8164  2         RESULT_PTR: REF VECTOR[1],      ! Pointer to result location
;  8079          8165  2         FRAMEPTR: REF VECTOR[1];        ! Pointer to frame pointer location
;  8080          8166  2
;  8081          8167  2     LITERAL
;  8082          8168  2         STACK_SIZE      = 256;
;  8083          8169  2
;  8084          8170  2     LOCAL
;  8085          8171  2         CALL_RESULT,                    ! Result of embedded routine call
;  8086          8172  2         STACK_PTR,                      ! Pointer to the top of stack.
;  8087          8173  2         OVERFLOW_POINT,                 ! Pointer to stack upper limit.
;  8088          8174  2         UNDERFLOW_POINT,                ! Pointer to stack lower limit.
;  8089          8175  2         INSTRUC : REF VECTOR [,BYTE];   ! Pointer to the current stack instruct
;  8090          8176  2
;  8091          8177  2     MACRO
;  8092          8178  2         TOP_CELL =      (.STACK_PTR) %,
;  8093          8179  2         SECOND_CELL =   (.STACK_PTR + 4) %,
;  8094        M 8180  2         PUSH(I) =       STACK_PTR = .STACK_PTR - (I)*%UPVAL;
;  8095        M 8181  2                         IF .STACK_PTR LSSA .OVERFLOW_POINT
;  8096        M 8182  2                         THEN
;  8097          8183  2                             $DBG_ERROR('RSTACCESS\STACK_MACHINE 10') %,
;  8098          8184  2
```

```
;  8099     M 8185  2          POP(I) =        STACK_PTR = .STACK_PTR + (I)*%UPVAL;
;  8100     M 8186  2                          IF .STACK_PTR GTRA .UNDERFLOW_POINT
;  8101     M 8187  2                          THEN
;  8102       8188  2                              $DBG_ERROR('RSTACCESS\STACK_MACHINE 20') %,
;  8103       8189  2
;  8104     M 8190  2          PUSH_BYTE(I) =  STACK_PTR =
;  8105     M 8191  2                                  .STACK_PTR -
;  8106     M 8192  2                                      ((I) + (IF (I) MOD %UPVAL NEQ 0
;  8107     M 8193  2                                          THEN %UPVAL - ((I) MOD %UPVAL)
;  8108     M 8194  2                                          ELSE 0));
;  8109     M 8195  2                          IF .STACK_PTR LSSA .OVERFLOW_POINT
;  8110     M 8196  2                          THEN
;  8111       8197  2                              $DBG_ERROR('RSTACCESS\STACK_MACHINE 30') %,
;  8112       8198  2
;  8113     M 8199  2          CHECK_CELLS(I) =IF .UNDERFLOW_POINT - .STACK_PTR LSS (I)*%UPVAL
;  8114     M 8200  2                          THEN
;  8115       8201  2                              $DBG_ERROR('RSTACCESS\STACK_MACHINE 40') %;
;  8116       8202  2
;  8117       8203  2
;  8118       8204  2
;  8119       8205  2          ! Initialize the stack and the pointer to the instruction stream.
;  8120       8206  2          !
;  8121       8207  2          OVERFLOW_POINT = DBG$GET_TEMPMEM(STACK_SIZE);
;  8122       8208  2          UNDERFLOW_POINT = .OVERFLOW_POINT + 4*STACK_SIZE;
;  8123       8209  2          STACK_PTR = .UNDERFLOW_POINT;
;  8124       8210  2          INSTRUC = .STK_CODE_PTR;
;  8125       8211  2
;  8126       8212  2
;  8127       8213  2          ! Initialize FRAMEPTR to zero--this will be changed if registers are used.
;  8128       8214  2          !
;  8129       8215  2          FRAMEPTR[0] = 0;
;  8130       8216  2
;  8131       8217  2
;  8132       8218  2          ! Evaluate the Stack Machine "routine" by looping through its instructions
;  8133       8219  2          ! until we reach the Stop command.
;  8134       8220  2          !
;  8135       8221  2          WHILE .INSTRUC[0] NEQ DST$K_STK_STOP DO
;  8136       8222  3              BEGIN
;  8137       8223  3
;  8138       8224  3
;  8139       8225  3              ! Do a CASE on the current Stack Machine Op Code and execute each
;  8140       8226  3              ! op code as appropriate.
;  8141       8227  3              !
;  8142       8228  3              CASE .INSTRUC[0] FROM DST$K_STK_LOW TO DST$K_STK_HIGH OF
;  8143       8229  3                  SET
;  8144       8230  3
;  8145       8231  3
;  8146       8232  3                      ! Push the value of a register on the stack.
;  8147       8233  3                      !
;  8148       8234  3                      [DST$K_STK_PUSHR0,
;  8149       8235  3                       DST$K_STK_PUSHR1,
;  8150       8236  3                       DST$K_STK_PUSHR2,
;  8151       8237  3                       DST$K_STK_PUSHR3,
;  8152       8238  3                       DST$K_STK_PUSHR4,
;  8153       8239  3                       DST$K_STK_PUSHR5,
;  8154       8240  3                       DST$K_STK_PUSHR6,
;  8155       8241  3                       DST$K_STK_PUSHR7,
```

```
;  8156     8242  3                DST$K_STK_PUSHR8,
;  8157     8243  3                DST$K_STK_PUSHR9,
;  8158     8244  3                DST$K_STK_PUSHR10,
;  8159     8245  3                DST$K_STK_PUSHR11,
;  8160     8246  3                DST$K_STK_PUSHRAP,
;  8161     8247  3                DST$K_STK_PUSHRFP,
;  8162     8248  3                DST$K_STK_PUSHRSP,
;  8163     8249  3                DST$K_STK_PUSHRPC]:
;  8164     8250  4                    BEGIN
;  8165     8251  4                    LOCAL REGISTR;
;  8166     8252  4                    PUSH(1);
;  8167     8253  4                    REGISTR =
;  8168     8254  5                            (CASE .INSTRUC[0]
;  8169     8255  5                                FROM DST$K_STK_PUSHR0 TO DST$K_STK_PUSHRPC OF
;  8170     8256  5                                SET
;  8171     8257  5                                [DST$K_STK_PUSHR0]: 0;
;  8172     8258  5                                [DST$K_STK_PUSHR1]: 1;
;  8173     8259  5                                [DST$K_STK_PUSHR2]: 2;
;  8174     8260  5                                [DST$K_STK_PUSHR3]: 3;
;  8175     8261  5                                [DST$K_STK_PUSHR4]: 4;
;  8176     8262  5                                [DST$K_STK_PUSHR5]: 5;
;  8177     8263  5                                [DST$K_STK_PUSHR6]: 6;
;  8178     8264  5                                [DST$K_STK_PUSHR7]: 7;
;  8179     8265  5                                [DST$K_STK_PUSHR8]: 8;
;  8180     8266  5                                [DST$K_STK_PUSHR9]: 9;
;  8181     8267  5                                [DST$K_STK_PUSHR10]: 10;
;  8182     8268  5                                [DST$K_STK_PUSHR11]: 11;
;  8183     8269  5                                [DST$K_STK_PUSHRAP]: 12;
;  8184     8270  5                                [DST$K_STK_PUSHRFP]: 13;
;  8185     8271  5                                [DST$K_STK_PUSHRSP]: 14;
;  8186     8272  5                                [DST$K_STK_PUSHRPC]: 15;
;  8187     8273  5                                TES
;  8188     8274  4                            );
;  8189     8275  4
;  8190     8276  4                    IF .DBG$REG_VECTOR[.REGISTR] NEQ 0
;  8191     8277  4                    THEN
;  8192     8278  5                        BEGIN
;  8193     8279  5                        TOP_CELL = .DBG$REG_VALUES[.REGISTR];
;  8194     8280  5                        INSTRUC = .INSTRUC + 1;
;  8195     8281  5                        END
;  8196     8282  5
;  8197     8283  4                    ELSE
;  8198     8284  4                        VALSPEC_SCOPE_ERROR();
;  8199     8285  4
;  8200     8286  4                    FRAMEPTR[0] = .DBG$REG_VALUES[13];
;  8201     8287  3                    END;
;  8202     8288  3
;  8203     8289  3
;  8204     8290  3            ! PUSH IMMEDIATE              1, 2, or 4 bytes following this opcode
;  8205     8291  3            ! BYTE WORD OR LONG           are sign extended to 32 bits and PUSHed
;  8206     8292  3            !                             on the stack
;  8207     8293  3            !
;  8208     8294  3            [DST$K_STK_PUSHIMB]:
;  8209     8295  4                BEGIN
;  8210     8296  4                LOCAL OPERAND : REF VECTOR [,BYTE,SIGNED];
;  8211     8297  4                PUSH(1);
;  8212     8298  4                OPERAND = INSTRUC[1];
```

```
;  8213          8299  4                 TOP_CELL = .OPERAND[0];
;  8214          8300  4                 INSTRUC = .INSTRUC + 2;
;  8215          8301  3                 END;
;  8216          8302  3
;  8217          8303  3             [DST$K_STK_PUSHIMW]:
;  8218          8304  4                 BEGIN
;  8219          8305  4                 LOCAL OPERAND : REF VECTOR [,WORD, SIGNED];
;  8220          8306  4                 PUSH(1);
;  8221          8307  4                 OPERAND = INSTRUC[1];
;  8222          8308  4                 TOP_CELL = .OPERAND[0];
;  8223          8309  4                 INSTRUC = .INSTRUC + 3;
;  8224          8310  3                 END;
;  8225          8311  3
;  8226          8312  3             [DST$K_STK_PUSHIML]:
;  8227          8313  4                 BEGIN
;  8228          8314  4                 LOCAL OPERAND : REF VECTOR [,LONG];
;  8229          8315  4                 PUSH(1);
;  8230          8316  4                 OPERAND = INSTRUC[1];
;  8231          8317  4                 TOP_CELL = .OPERAND[0];
;  8232          8318  4                 INSTRUC = .INSTRUC + 5;
;  8233          8319  3                 END;
;  8234          8320  3
;  8235          8321  3
;  8236          8322  3             ! PUSH IMMEDIATE VARIABLE   The byte following the opcode
;  8237          8323  3             !                           interpreted as an unsigned byte count.
;  8238          8324  3             !                           A block of data, immediately following
;  8239          8325  3             !                           the count byte, is PUSHed on the stack.
;  8240          8326  3             !
;  8241          8327  3             [DST$K_STK_PUSHIM_VAR]:
;  8242          8328  4                 BEGIN
;  8243          8329  4                 PUSH_BYTE(.INSTRUC[1]);
;  8244          8330  4                 CH$MOVE( .INSTRUC[1], INSTRUC[2], TOP_CELL );
;  8245          8331  4                 INSTRUC = INSTRUC[2] + .INSTRUC[1];
;  8246          8332  3                 END;
;  8247          8333  3
;  8248          8334  3
;  8249          8335  3             ! PUSH IMMEDIATE UNSIGNED   1 or 2 bytes following this opcode
;  8250          8336  3             ! BYTE OR WORD              are zero extended to 32 bits and PUSHed
;  8251          8337  3             !                           on the stack
;  8252          8338  3             !
;  8253          8339  3             [DST$K_STK_PUSHIMBU]:
;  8254          8340  4                 BEGIN
;  8255          8341  4                 PUSH(1);
;  8256          8342  4                 TOP_CELL = .INSTRUC[1];
;  8257          8343  4                 INSTRUC = .INSTRUC + 2;
;  8258          8344  3                 END;
;  8259          8345  3
;  8260          8346  3             [DST$K_STK_PUSHIMWU]:
;  8261          8347  4                 BEGIN
;  8262          8348  4                 LOCAL OPERAND : REF VECTOR [,WORD];
;  8263          8349  4                 PUSH(1);
;  8264          8350  4                 OPERAND = INSTRUC[1];
;  8265          8351  4                 TOP_CELL = .OPERAND[0];
;  8266          8352  4                 INSTRUC = .INSTRUC + 3;
;  8267          8353  3                 END;
;  8268          8354  3
;  8269          8355  3
```

```
;  8270     8356  3            ! PUSH INDIRECT     The top stack cell is popped and 1, 2, or 4
;  8271     8357  3            ! BYTE WORD OR LONG bytes at the address given by the popped
;  8272     8358  3            !                   stack cell are sign extended to 32 bits and
;  8273     8359  3            !                   pushed on the stack.
;  8274     8360  3            !
;  8275     8361  3            [DST$K_STK_PUSHINB]:
;  8276     8362  4                BEGIN
;  8277     8363  4                LOCAL OPERAND : REF VECTOR [,BYTE, SIGNED];
;  8278     8364  4                OPERAND = .TOP_CELL;
;  8279     8365  4                TOP_CELL = .OPERAND[0];
;  8280     8366  4                INSTRUC = .INSTRUC + 1;
;  8281     8367  3                END;
;  8282     8368  3
;  8283     8369  3            [DST$K_STK_PUSHINW]:
;  8284     8370  4                BEGIN
;  8285     8371  4                LOCAL OPERAND : REF VECTOR [,WORD,SIGNED];
;  8286     8372  4                OPERAND = .TOP_CELL;
;  8287     8373  4                TOP_CELL = .OPERAND[0];
;  8288     8374  4                INSTRUC = .INSTRUC + 1;
;  8289     8375  3                END;
;  8290     8376  3
;  8291     8377  3            [DST$K_STK_PUSHINL]:
;  8292     8378  4                BEGIN
;  8293     8379  4                LOCAL OPERAND: REF VECTOR[,LONG];
;  8294     8380  4                OPERAND = .TOP_CELL;
;  8295     8381  4                TOP_CELL = .OPERAND[0];
;  8296     8382  4                INSTRUC = .INSTRUC + 1;
;  8297     8383  3                END;
;  8298     8384  3
;  8299     8385  3
;  8300     8386  3            ! PUSH INDIRECT UNSIGNED    The top stack cell is popped and 1 or 2
;  8301     8387  3            ! BYTE OR WORD              bytes at the address given by the popped
;  8302     8388  3            !                           stack cell are zero extended to 32 bits
;  8303     8389  3            !                           and pushed on the stack.
;  8304     8390  3            !
;  8305     8391  3            [DST$K_STK_PUSHINBU]:
;  8306     8392  4                BEGIN
;  8307     8393  4                LOCAL OPERAND : REF VECTOR [,BYTE];
;  8308     8394  4                OPERAND = .TOP_CELL;
;  8309     8395  4                TOP_CELL = .OPERAND[0];
;  8310     8396  4                INSTRUC = .INSTRUC + 1;
;  8311     8397  3                END;
;  8312     8398  3
;  8313     8399  3            [DST$K_STK_PUSHINWU]:
;  8314     8400  4                BEGIN
;  8315     8401  4                LOCAL OPERAND : REF VECTOR [,WORD];
;  8316     8402  4                OPERAND = .TOP_CELL;
;  8317     8403  4                TOP_CELL = .OPERAND[0];
;  8318     8404  4                INSTRUC = .INSTRUC + 1;
;  8319     8405  3                END;
;  8320     8406  3
;  8321     8407  3
;  8322     8408  3            ! ADD                       The top two stack cells are added and
;  8323     8409  3            !                           replaced by a single cell containing
;  8324     8410  3            !                           their sum
;  8325     8411  3            !
;  8326     8412  3            [DST$K_STK_ADD]:
```

```
;  8327     8413  4                BEGIN
;  8328     8414  4                CHECK_CELLS(2);
;  8329     8415  4                SECOND_CELL = .TOP_CELL + .SECOND_CELL;
;  8330     8416  4                POP(1);
;  8331     8417  4                INSTRUC = .INSTRUC + 1;
;  8332     8418  3                END;
;  8333     8419  3
;  8334     8420  3
;  8335     8421  3            ! SUBTRACT          The second stack cell is subtracted from
;  8336     8422  3            !                   the first stack cell. Both are popped.
;  8337     8423  3            !                   Their difference is PUSHed.
;  8338     8424  3            !
;  8339     8425  3            [DST$K_STK_SUB]:
;  8340     8426  4                BEGIN
;  8341     8427  4                CHECK_CELLS(2);
;  8342     8428  4                SECOND_CELL = .TOP_CELL - .SECOND_CELL;
;  8343     8429  4                POP(1);
;  8344     8430  4                INSTRUC = .INSTRUC + 1;
;  8345     8431  3                END;
;  8346     8432  3
;  8347     8433  3
;  8348     8434  3            ! MULTIPLY          The top two stack cells are multiplied
;  8349     8435  3            !                   and replaced by a single cell containing
;  8350     8436  3            !                   their product
;  8351     8437  3            !
;  8352     8438  3            [DST$K_STK_MULT]:
;  8353     8439  4                BEGIN
;  8354     8440  4                CHECK_CELLS(2);
;  8355     8441  4                SECOND_CELL = (.TOP_CELL)*(.SECOND_CELL);
;  8356     8442  4                POP(1);
;  8357     8443  4                INSTRUC = .INSTRUC + 1;
;  8358     8444  3                END;
;  8359     8445  3
;  8360     8446  3
;  8361     8447  3            ! DIVIDE                The top stack cell is divided by the
;  8362     8448  3            !                       secondstack cell. Both are popped.
;  8363     8449  3            !                       Their qoutient is PUSHed.
;  8364     8450  3            !
;  8365     8451  3            [DST$K_STK_DIV]:
;  8366     8452  4                BEGIN
;  8367     8453  4                CHECK_CELLS(2);
;  8368     8454  4                IF .(SECOND_CELL) EQL 0
;  8369     8455  4                THEN
;  8370     8456  4                    $DBG_ERROR('RSTACCESS\STACK_MACHINE 50')
;  8371     8457  4
;  8372     8458  4                ELSE
;  8373     8459  5                    BEGIN
;  8374     8460  5                    SECOND_CELL = (.TOP_CELL)/(.SECOND_CELL);
;  8375     8461  5                    POP(1);
;  8376     8462  5                    INSTRUC = .INSTRUC + 1;
;  8377     8463  5                    END
;  8378     8464  3                END;
;  8379     8465  3
;  8380     8466  3
;  8381     8467  3            ! LOGICAL SHIFT     The top stack cell is interpreted as
;  8382     8468  3            !                   the number of bit positions to shift the
;  8383     8469  3            !                   second stack cell. Both are popped.
```

```
;  8384          8470  3                !                       The shifted second cell is PUSHed.
;  8385          8471  3                !
;  8386          8472  3            [DST$K_STK_LSH]:
;  8387          8473  4                BEGIN
;  8388          8474  4                CHECK_CELLS(2);
;  8389          8475  4                IF ABS( .TOP_CELL ) GEQ %BPVAL
;  8390          8476  4                THEN
;  8391          8477  5                    BEGIN
;  8392          8478  5                    POP(1);
;  8393          8479  5                    TOP_CELL = 0;
;  8394          8480  5                    INSTRUC = .INSTRUC + 1;
;  8395          8481  5                    END
;  8396          8482  4                ELSE
;  8397          8483  5                    BEGIN
;  8398          8484  5                    IF .TOP_CELL GTR 0
;  8399          8485  5                    THEN
;  8400          8486  5
;  8401          8487  5                        ! Number of bit positions is positive, shift to the left.
;  8402          8488  5                        !
;  8403          8489  6                        BEGIN
;  8404          8490  6                        SECOND_CELL = (.SECOND_CELL)^(.TOP_CELL);
;  8405          8491  6                        POP(1);
;  8406          8492  6                        INSTRUC = .INSTRUC + 1;
;  8407          8493  6                        END
;  8408          8494  5                    ELSE
;  8409          8495  5
;  8410          8496  5                        ! Number of bit positions is negative, shift to the right.
;  8411          8497  5                        ! This is a logical, rather than an arithmetic shift, so
;  8412          8498  5                        ! we'll have to do some magic, rather than use the BLISS
;  8413          8499  5                        ! shift operator.
;  8414          8500  5                        !
;  8415          8501  6                        BEGIN
;  8416          8502  6                        LOCAL POSITION, SIZ;
;  8417          8503  6                        POSITION = -.TOP_CELL;
;  8418          8504  6                        SIZ = %BPVAL - .POSITION;
;  8419          8505  6                        SECOND_CELL = .(SECOND_CELL)<.POSITION, .SIZ>;
;  8420          8506  6                        POP(1);
;  8421          8507  6                        INSTRUC = .INSTRUC + 1;
;  8422          8508  5                        END;
;  8423          8509  5                    END
;  8424          8510  3                END;
;  8425          8511
;  8426          8512
;  8427          8513                ! ROTATE                The top stack cell is interpreted as the
;  8428          8514                !                       number of bit positions to rotate the
;  8429          8515                !                       second stack cell. Both are popped.
;  8430          8516                !                       The rotated second cell is PUSHed.
;  8431          8517                !
;  8432          8518  3             [DST$K_STK_ROT]:
;  8433          8519  4                BEGIN
;  8434          8520  4                LOCAL BITS_TO_ROT;
;  8435          8521  4                CHECK_CELLS(2);
;  8436          8522  4                BITS_TO_ROT = .TOP_CELL MOD %BPVAL;
;  8437          8523  4                IF .BITS_TO_ROT GTR 0
;  8438          8524  4                THEN
;  8439          8525  4
;  8440          8526  4                    ! Number of bit positions is positive, rotate to the left.
```

```
;  8441          8527  4                !
;  8442          8528  5                BEGIN
;  8443          8529  5                LOCAL OPERAND, TARG_POS, SRC_POS, SIZ;
;  8444          8530  5                OPERAND = .(SECOND_CELL);
;  8445          8531  5
;  8446          8532  5                ! Move the low order bits of the source to the high order
;  8447          8533  5                ! bits of the target and the high order bits of the source to
;  8448          8534  5                ! the low order bits of the target.
;  8449          8535  5                !
;  8450          8536  5                !             31                        0
;  8451          8537  5                !            +-------------------------+
;  8452          8538  5                !   source       |           |           |
;  8453          8539  5                !            +-------------------------+
;  8454          8540  5                !            |.BITS_TO_ROT|           |
;  8455          8541  5                !                   |                    |
;  8456          8542  5                !                    -------------       |
;  8457          8543  5                !                   |  |                 |
;  8458          8544  5                !                   |   ----------       |
;  8459          8545  5                !                   |                    |
;  8460          8546  5                !                  \ /                  \ /
;  8461          8547  5                !            +-------------------------+
;  8462          8548  5                !   target       |           |           |
;  8463          8549  5                !            +-------------------------+
;  8464          8550  5                !
;  8465          8551  5                TARG_POS = .BITS_TO_ROT;
;  8466          8552  5                SRC_POS  = 0;
;  8467          8553  5                SIZ = %BPVAL - TARG_POS;
;  8468          8554  5                (SECOND_CELL)<.TARG_POS, .SIZ> = .OPERAND<.SRC_POS, .SIZ>;
;  8469          8555  5
;  8470          8556  5                ! Move the high order bits of the source to the low order
;  8471          8557  5                ! bits of the target.
;  8472          8558  5                !
;  8473          8559  5                TARG_POS = 0;
;  8474          8560  5                SRC_POS  = %BPVAL - .BITS_TO_ROT;
;  8475          8561  5                SIZ = .BITS_TO_ROT;
;  8476          8562  5                (SECOND_CELL)<.TARG_POS, .SIZ> = .OPERAND<.SRC_POS, .SIZ>;
;  8477          8563  5
;  8478          8564  5                ! Adjust the stack pointer,
;  8479          8565  5                !
;  8480          8566  5                POP(1);
;  8481          8567  5                INSTRUC = .INSTRUC + 1;
;  8482          8568  5                END
;  8483          8569  5
;  8484          8570  4             ELSE
;  8485          8571  4
;  8486          8572  4                ! Number of bit positions is negative, rotate to the right.
;  8487          8573  4                !
;  8488          8574  5                BEGIN
;  8489          8575  5                LOCAL OPERAND, TARG_POS, SRC_POS, SIZ;
;  8490          8576  5                OPERAND = .SECOND_CELL;
;  8491          8577  5
;  8492          8578  5                ! Move the high order bits of the source to the low order
;  8493          8579  5                ! bits of the target and the low order bits of the source to
;  8494          8580  5                ! the high order bits of the target.
;  8495          8581  5                !
;  8496          8582  5                !             31                        0
;  8497          8583  5                !            +-------------------------+
```

```
;  8498          8584  5                !   source      |     |                  |
;  8499          8585  5                !               +------------------------+
;  8500          8586  5                !                      |  |-.BITS_TO_ROT|
;  8501          8587  5                !                      |  |
;  8502          8588  5                !                    ------------
;  8503          8589  5                !                  |  |
;  8504          8590  5                !                  |  ------------
;  8505          8591  5                !                  |           |
;  8506          8592  5                !                 \|/         \|/
;  8507          8593  5                !               +------------------------+
;  8508          8594  5                !   target      |     |                  |
;  8509          8595  5                !               +------------------------+
;  8510          8596  5                !
;  8511          8597  5                TARG_POS = %BPVAL - .BITS_TO_ROT;
;  8512          8598  5                SRC_POS  = 0;
;  8513          8599  5                SIZ      = .BITS_TO_ROT;
;  8514          8600  5                (SECOND_CELL)<.TARG_POS, .SIZ> = .OPERAND<.SRC_POS, .SIZ>;
;  8515          8601  5
;  8516          8602  5                ! Move the high order bits of the source to the low order
;  8517          8603  5                ! bits of the target.
;  8518          8604  5                !
;  8519          8605  5                TARG_POS = 0;
;  8520          8606  5                SRC_POS  = .BITS_TO_ROT;
;  8521          8607  5                SIZ      = %BPVAL - .BITS_TO_ROT;
;  8522          8608  5                (SECOND_CELL)<.TARG_POS, .SIZ> = .OPERAND<.SRC_POS, .SIZ>;
;  8523          8609  5
;  8524          8610  5
;  8525          8611  5                ! Adjust the stack pointer,
;  8526          8612  5                !
;  8527          8613  5                POP(1);
;  8528          8614  5                INSTRUC = .INSTRUC + 1;
;  8529          8615  5                END;
;  8530          8616  4
;  8531          8617  4            END;
;  8532          8618  3
;  8533          8619  3
;  8534          8620  3            ! COPY                          The top stack cell is PUSHed
;  8535          8621  3            !
;  8536          8622  3            [DST$K_STK_COP]:
;  8537          8623  3                BEGIN
;  8538          8624  4                PUSH(1);
;  8539          8625  4                TOP_CELL = .SECOND_CELL;
;  8540          8626  4                INSTRUC = .INSTRUC + 1;
;  8541          8627  4                END;
;  8542          8628  3
;  8543          8629  3
;  8544          8630  3            ! EXCHANGE                      The top two stack cells are exchanged
;  8545          8631  3            !
;  8546          8632  3            [DST$K_STK_EXCH]:
;  8547          8633  3                BEGIN
;  8548          8634  4                LOCAL WORK_CELL;
;  8549          8635  4                WORK_CELL = .TOP_CELL;
;  8550          8636  4                TOP_CELL = .SECOND_CELL;
;  8551          8637  4                SECOND_CELL = .WORK_CELL;
;  8552          8638  4                INSTRUC = .INSTRUC + 1;
;  8553          8639  4                END;
;  8554          8640  3
```

```
;  8555     8641  3
;  8556     8642  3
;  8557     8643  3                    ! STORE BYTE WORD OR LONG
;  8558     8644  3                    !                       The byte following this operand is
;  8559     8645  3                    !                       interpreted as a signed (for consistency
;  8560     8646  3                    !                       with something, see Grove) byte offset
;  8561     8647  3                    !                       into the stack. The low order byte, word,
;  8562     8648  3                    !                       or longword of the top stack cell is
;  8563     8649  3                    !                       copied into the byte, word or longword
;  8564     8650  3                    !                       at this location:
;  8565     8651  3                    !
;  8566     8652  3                    !                               address of the second stack cell
;  8567     8653  3                    !                                       +
;  8568     8654  3                    !                               the specified byte offset.
;  8569     8655  3                    !
;  8570     8656  3                    !                       (Keep in mind that the address of the
;  8571     8657  3                    !                       third stack cell is the address of the
;  8572     8658  3                    !                       second stack cell plus four.)
;  8573     8659  3                    !                       The stack is popped.
;  8574     8660  3                    !
;  8575     8661  3                    [DST$K_STK_STO_B,
;  8576     8662  3                     DST$K_STK_STO_W,
;  8577     8663  3                     DST$K_STK_STO_L]:
;  8578     8664  4                        BEGIN
;  8579     8665  4                        LOCAL TARGET, SIZ;
;  8580     8666  4                        TARGET = SECOND_CELL + .INSTRUC[1];
;  8581     8667  4                        SIZ =
;  8582     8668  5                            (CASE .INSTRUC[0] FROM DST$K_STK_STO_B TO DST$K_STK_STO_L OF
;  8583     8669  5                                SET
;  8584     8670  5                                [DST$K_STK_STO_B]: 1;
;  8585     8671  5                                [DST$K_STK_STO_W]: 2;
;  8586     8672  5                                [DST$K_STK_STO_L]: 4;
;  8587     8673  4                                TES);
;  8588     8674  4                        CH$MOVE(.SIZ, TOP_CELL, .TARGET);
;  8589     8675  4                        POP(1);
;  8590     8676  4                        INSTRUC = .INSTRUC + 2;
;  8591     8677  3                        END;
;  8592     8678  3
;  8593     8679  3
;  8594     8680  3                    ! POP                           The top stack cell is removed from the
;  8595     8681  3                    !                               stack.
;  8596     8682  3                    !
;  8597     8683  3                    [DST$K_STK_POP]:
;  8598     8684  4                        BEGIN
;  8599     8685  4                        POP(1);
;  8600     8686  4                        INSTRUC = .INSTRUC + 1;
;  8601     8687  3                        END;
;  8602     8688  3
;  8603     8689  3
;  8604     8690  3                    ! RTNCALL                       Call a compiler-supplied routine to
;  8605     8691  3                    !                               compute a value to be put on the stack.
;  8606     8692  3                    !                               We assume that the routine address is
;  8607     8693  3                    !                               already on top of the stack.  That ad-
;  8608     8694  3                    !                               dress is popped and the returned value
;  8609     8695  3                    !                               is pushed on the stack.
;  8610     8696  3                    !
;  8611     8697  3                    [DST$K_STK_RTNCALL]:
```

```
;  8612          8698  4          BEGIN
;  8613          8699  4          LOCAL
;  8614          8700  4              Temp_thunk_addr;
;  8615          8701  4          Temp_thunk_addr = .TOP_CELL;                    ! Save the routine address,
;  8616          8702  4          CALL_RESULT = 0;
;  8617          8703  4          POP(T);                                         ! Pop off the thunk address
;  8618          8704  4          VALSPEC_ROUT_CALL(CALL_RESULT, .Temp_thunk_addr, FALSE, TRUE,
;  8619          8705  4                           .STACK_PTR, .UNDERFLOW_POINT-.STACK_PTR);
;  8620          8706  4          PUSH(1);                                        ! Push for the call result
;  8621          8707  4          TOP_CELL = .CALL_RESULT;
;  8622          8708  4          FRAMEPTR[0] = .DBG$REG_VALUES[13];
;  8623          8709  4          INSTRUC = .INSTRUC + 1;
;  8624          8710  3          END;
;  8625          8711  3
;  8626          8712  3
;  8627          8713  3      ! RTN_NOFP                  Call a compiler-supplied routine to
;  8628          8714  3      !                           compute a value to be put on the stack.
;  8629          8715  3      !                           is pushed on the stack. Same as RTNCALL
;  8630          8716  3      !                           except no FP is passed in to thunk.
;  8631          8717  3      !
;  8632          8718  3      [DST$K_STK_RTN_NOFP]:
;  8633          8719  4          BEGIN
;  8634          8720  4          LOCAL
;  8635          8721  4              Temp_thunk_addr;
;  8636          8722  4          Temp_thunk_addr = .TOP_CELL;                    ! Save the routine address,
;  8637          8723  4          CALL_RESULT = 0;
;  8638          8724  4          POP(T);                                         ! Pop off the thunk address
;  8639          8725  4          VALSPEC_ROUT_CALL(CALL_RESULT, .Temp_thunk_addr, FALSE, FALSE,
;  8640          8726  4                           .STACK_PTR, .UNDERFLOW_POINT-.STACK_PTR);
;  8641          8727  4          PUSH(1);                                        ! Push for the call result
;  8642          8728  4          TOP_CELL = .CALL_RESULT;
;  8643          8729  4          FRAMEPTR[0] = .DBG$REG_VALUES[13];
;  8644          8730  4          INSTRUC = .INSTRUC + 1;
;  8645          8731  3          END;
;  8646          8732  3
;  8647          8733  3
;  8648          8734  3      ! RTNCALL_ALT               Call a compiler-supplied routine to
;  8649          8735  3      !                           compute a value to be put on the stack.
;  8650          8736  3      !                           We assume that the routine address is
;  8651          8737  3      !                           already on top of the stack.  That ad-
;  8652          8738  3      !                           dress is popped and the returned value
;  8653          8739  3      !                           (a quadword) is pushed on the stack.
;  8654          8740  3      !
;  8655          8741  3      [DST$K_STK_RTNCALL_ALT]:
;  8656          8742  4          BEGIN
;  8657          8743  4          LOCAL
;  8658          8744  4              Temp_thunk_addr,
;  8659          8745  4              CALL_RESULT : VECTOR[ 4 ];
;  8660          8746  4          Temp_thunk_addr = .TOP_CELL;                    ! Save the routine address,
;  8661          8747  4          CALL_RESULT[0] = 0;
;  8662          8748  4          CALL_RESULT[1] = 0;
;  8663          8749  4          CALL_RESULT[2] = 0;
;  8664          8750  4          CALL_RESULT[3] = 0;
;  8665          8751  4          POP(T);                                         ! Pop off the thunk address
;  8666          8752  4          VALSPEC_ROUT_CALL(CALL_RESULT, .Temp_thunk_addr, TRUE, TRUE,
;  8667          8753  4                           .STACK_PTR, .UNDERFLOW_POINT-.STACK_PTR);
;  8668          8754  4          PUSH( 4 );
```

```
;  8669          8755  4              CH$MOVE( 16, CH$PTR( CALL_RESULT ), CH$PTR( .STACK_PTR ) );
;  8670          8756  4              FRAMEPTR[0] = .DBG$REG_VALUES[13];
;  8671          8757  4              INSTRUC = .INSTRUC + 1;
;  8672          8758  3              END;
;  8673          8759  3
;  8674          8760  3
;  8675          8761  3          ! PUSH_OUTER_REC            Push the start address of the outer most
;  8676          8762  3          !                           record, described by the primary pointed
;  8677          8763  3          !                           to by DBG$GL_CURRENT_PRIMARY.  Originally
;  8678          8764  3          !                           implemented for use by languages which allow
;  8679          8765  3          !                           Self-referential records, (PL/I, ADA)
;  8680          8766  3          !
;  8681          8767  3          !                           Self-referential records are those which
;  8682          8768  3          !                           contain fields or structures whose actual
;  8683          8769  3          !                           allocated length depends on some preceding
;  8684          8770  3          !                           value within the record.  Thus, the address
;  8685          8771  3          !                           of any fields following the field or structure
;  8686          8772  3          !                           is not known at compile time, and therefore must
;  8687          8773  3          !                           be calculated at run-time.
;  8688          8774  3          !
;  8689          8775  3          [DST$K_STK_PUSH_OUTER_REC]:
;  8690          8776  4              BEGIN
;  8691          8777  4              PUSH(1);
;  8692          8778  4              TOP_CELL = DBG$GET_OUTER_REC_ADDRESS(.DBG$GL_CURRENT_PRIMARY);
;  8693          8779  4              INSTRUC = .INSTRUC + 1;
;  8694          8780  3              END;
;  8695          8781  3
;  8696          8782  3
;  8697          8783  3          ! PUSH_INNER_REC            Push the start address of the inner most
;  8698          8784  3          !                           record, described by the primary pointed
;  8699          8785  3          !                           to by DBG$GL_CURRENT_PRIMARY.  Originally
;  8700          8786  3          !                           implemented for use by languages which allow
;  8701          8787  3          !                           Self-referential records, (PL/I, ADA)
;  8702          8788  3          !
;  8703          8789  3          [DST$K_STK_PUSH_INNER_REC]:
;  8704          8790  4              BEGIN
;  8705          8791  4              PUSH(1);
;  8706          8792  4              TOP_CELL = DBG$GET_INNER_REC_ADDRESS(.DBG$GL_CURRENT_PRIMARY);
;  8707          8793  4              INSTRUC = .INSTRUC + 1;
;  8708          8794  3              END;
;  8709          8795  3
;  8710          8796  3
;  8711          8797  3          ! Any other op-code is an error.  Signal an internal bug.
;  8712          8798  3          !
;  8713          8799  3          [INRANGE, OUTRANGE]:
;  8714          8800  3              $DBG_ERROR('RSTACCESS\STACK_MACHINE - Invalid stack machine opcode. Bad DST');
;  8715          8801  3
;  8716          8802  3          TES;
;  8717          8803  3
;  8718          8804  2      END;                            ! End of WHILE loop over instructions
;  8719          8805  2
;  8720          8806  2
;  8721          8807  2  ! Fill in the result address and return.
;  8722          8808  2  !
;  8723          8809  2  RESULT_PTR[0] = TOP_CELL;
;  8724          8810  2  RETURN;
;  8725          8811  2
```

```
; 8726          8812  1     END;


                                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00561 P.AEJ:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  00570
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  0057C P.AEK:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  0058B
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00597 P.AEL:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  005A6
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  005B2 P.AEM:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  005C1
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  005CD P.AEN:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 30\
    30  33  20  45  4E  49  48  43  41  4D  5F  4B  005DC
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  005E8 P.AEO:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  005F7
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00603 P.AEP:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  00612
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  0061E P.AEQ:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 40\
    30  34  20  45  4E  49  48  43  41  4D  5F  4B  0062D
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00639 P.AER:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  00648
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00654 P.AES:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 40\
    30  34  20  45  4E  49  48  43  41  4D  5F  4B  00663
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  0066F P.AET:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  0067E
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  0068A P.AEU:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 40\
    30  34  20  45  4E  49  48  43  41  4D  5F  4B  00699
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  006A5 P.AEV:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  006B4
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  006C0 P.AEW:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 40\
    30  34  20  45  4E  49  48  43  41  4D  5F  4B  006CF
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  006DB P.AEX:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 50\
    30  35  20  45  4E  49  48  43  41  4D  5F  4B  006EA
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  006F6 P.AEY:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  00705
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00711 P.AEZ:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 40\
    30  34  20  45  4E  49  48  43  41  4D  5F  4B  00720
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  0072C P.AFA:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  0073B
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00747 P.AFB:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  00756
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00762 P.AFC:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  00771
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  0077D P.AFD:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 40\
    30  34  20  45  4E  49  48  43  41  4D  5F  4B  0078C
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00798 P.AFE:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  007A7
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  007B3 P.AFF:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  007C2
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  007CE P.AFG:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\
    30  31  20  45  4E  49  48  43  41  4D  5F  4B  007DD
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  007E9 P.AFH:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
    30  32  20  45  4E  49  48  43  41  4D  5F  4B  007F8
43  41  54  53  5C  53  53  45  43  43  41  54  53  52  1A  00804 P.AFI:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\
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                30 32 20 45 4E 49 48 43 41 4D 5F 4B 00813
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 0081F P.AFJ:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\          ;
                30 32 20 45 4E 49 48 43 41 4D 5F 4B 0082E
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 0083A P.AFK:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\          ;
                30 31 20 45 4E 49 48 43 41 4D 5F 4B 00849
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 00855 P.AFL:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\          ;
                30 32 20 45 4E 49 48 43 41 4D 5F 4B 00864
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 00870 P.AFM:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\          ;
                30 31 20 45 4E 49 48 43 41 4D 5F 4B 0087F
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 0088B P.AFN:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 20\          ;
                30 32 20 45 4E 49 48 43 41 4D 5F 4B 0089A
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 008A6 P.AFO:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\          ;
                30 31 20 45 4E 49 48 43 41 4D 5F 4B 008B5
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 008C1 P.AFP:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\          ;
                30 31 20 45 4E 49 48 43 41 4D 5F 4B 008D0
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 1A 008DC P.AFQ:  .ASCII  <26>\RSTACCESS\<92>\STACK_MACHINE 10\          ;
                30 31 20 45 4E 49 48 43 41 4D 5F 4B 008EB
43 41 54        53 5C 53 53 45 43 43 41 54 53 52 3F 008F7 P.AFR:  .ASCII  \?RSTACCESS\<92>\STACK_MACHINE - Invalid\      ;
76 6E 49 20 2D 20 45 4E 49 48 43 41 4D 5F 4B 00906
                                64 69 6C 61 00915
20 65 6E 69 68 63 61 6D 20 6B 63 61 74 73 20 00919        .ASCII  \ stack machine opcode. Bad DST\                    ;
54 53 44 20 64 61 42 20 2E 65 64 6F 63 70 6F 00928


                                                          .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                            OFFC 00000 STACK_MACHINE:
                                                          .WORD   Save R2,R3,R4,R5,R6,R7,R8,R9,R10,R11                ; 8128
                             5E                 18 C2 00002          SUBL2   #24, SP
                             7E           0100  8F 3C 00005          MOVZWL  #256, -(SP)                             ; 8207
                 00000000G   00                 01 FB 0000A          CALLS   #1, DBG$GET_TEMPMEM
                             5A                 50 D0 00011          MOVL    R0, OVERFLOW_POINT
                             59           0400  CA 9E 00014          MOVAB   1024(R10), UNDERFLOW_POINT              ; 8208
                             56                 59 D0 00019          MOVL    UNDERFLOW_POINT, STACK_PTR              ; 8209
                             57             04  AC D0 0001C          MOVL    STK_CODE_PTR, INSTRUC                   ; 8210
                                            0C  BC D4 00020          CLRL    @FRAMEPTR                               ; 8215
                             17                 67 91 00023 1$:      CMPB    (INSTRUC), #23                          ; 8221
                                                03 12 00026          BNEQ    2$
                                              063A 31 00028          BRW     107$
                             2C                 00    67 8F 0002B 2$:  CASEB   (INSTRUC), #0, #44                     ; 8228
                0063         0063          0063      0063 0002F 3$:  .WORD   5$-3$,-
                0063         0063          0063      0063 00037              5$-3$,-
                0063         0063          0063      0063 0003F              5$-3$,-
                0063         0063          0063      0063 00047              5$-3$,-
                0249         0163          013C      0115 0004F              5$-3$,-
                005A         0230          0228      0220 00057              5$-3$,-
                0238         01F6          01D2      018C 0005F              5$-3$,-
                02D5         02A7          0277      0240 00067              5$-3$,-
                046C         0449          03A2      0322 0006F              5$-3$,-
                04C0         0479          0479      0479 00077              5$-3$,-
                0606         05DC          0579      04E0 0007F              5$-3$,-
                                                     0524 00087              5$-3$,-
                                                                             5$-3$,-
                                                                             5$-3$,-
                                                                             5$-3$,-
                                                                             5$-3$,-
                                                                             5$-3$,-
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                                                                27$-3$,-                                                                ;
                                                                29$-3$,-                                                                ;
                                                                31$-3$,-                                                                ;
                                                                51$-3$,-                                                                ;
                                                                45$-3$,-                                                                ;
                                                                46$-3$,-                                                                ;
                                                                47$-3$,-                                                                ;
                                                                4$-3$,-                                                                 ;
                                                                34$-3$,-                                                                ;
                                                                39$-3$,-                                                                ;
                                                                41$-3$,-                                                                ;
                                                                48$-3$,-                                                                ;
                                                                49$-3$,-                                                                ;
                                                                53$-3$,-                                                                ;
                                                                55$-3$,-                                                                ;
                                                                58$-3$,-                                                                ;
                                                                64$-3$,-                                                                ;
                                                                72$-3$,-                                                                ;
                                                                77$-3$,-                                                                ;
                                                                79$-3$,-                                                                ;
                                                                81$-3$,-                                                                ;
                                                                81$-3$,-                                                                ;
                                                                81$-3$,-                                                                ;
                                                                88$-3$,-                                                                ;
                                                                91$-3$,-                                                                ;
                                                                97$-3$,-                                                                ;
                                                                101$-3$,-                                                               ;
                                                                103$-3$,-                                                               ;
                                                                93$-3$                                                                  ;
                        00000000'  EF   9F  00089 4$:   PUSHAB  P.AFR                                                                   ; 8800
                                   029B 31  0008F       BRW     60$                                                                     ;
                    56             04   C2  00092 5$:   SUBL2   #4, STACK_PTR                                                          ; 8252
                    5A             56   D1  00095       CMPL    STACK_PTR, OVERFLOW_POINT                                               ;
                                   15   1E  00098       BGEQU   6$                                                                      ;
                        00000000'  EF   9F  0009A       PUSHAB  P.AEJ                                                                   ;
                                   01   DD  000A0       PUSHL   #1                                                                      ;
                        00028362   8F   DD  000A2       PUSHL   #164706                                                                 ;
                00000000G  00      03   FB  000A8       CALLS   #3, LIB$SIGNAL                                                          ;
                      0F           00   8F  000AF 6$:   CASEB   (INSTRUC), #0, #15                                                    ; 8254
    002E            0029         0024      0020   000B3 7$:   .WORD   8$-7$,-                                                          ;
    0042            003D         0038      0033   000BB         9$-7$,-                                                               ;
    0056            0051         004C      0047   000C3         10$-7$,-                                                              ;
    006A            0065         0060      005B   000CB         11$-7$,-                                                              ;
                                                                12$-7$,-                                                                ;
                                                                13$-7$,-                                                                ;
                                                                14$-7$,-                                                                ;
                                                                15$-7$,-                                                                ;
                                                                16$-7$,-                                                                ;
                                                                17$-7$,-                                                                ;
                                                                18$-7$,-                                                                ;
                                                                19$-7$,-                                                                ;
                                                                20$-7$,-                                                                ;
                                                                21$-7$,-                                                                ;
                                                                22$-7$,-                                                                ;
                                                                23$-7$                                                                  ;
                                   50   D4  000D3 8$:   CLRL    REGISTR                                                                 ;
                                   49   11  000D5       BRB     24$                                                                     ;
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                50              01   D0 000D7 9$:     MOVL    #1, REGISTR                                                     ;
                                44   11 000DA         BRB     24$
                50              02   D0 000DC 10$:    MOVL    #2, REGISTR                                                     ;
                                3F   11 000DF         BRB     24$
                50              03   D0 000E1 11$:    MOVL    #3, REGISTR                                                     ;
                                3A   11 000E4         BRB     24$
                50              04   D0 000E6 12$:    MOVL    #4, REGISTR                                                     ;
                                35   11 000E9         BRB     24$
                50              05   D0 000EB 13$:    MOVL    #5, REGISTR                                                     ;
                                30   11 000EE         BRB     24$
                50              06   D0 000F0 14$:    MOVL    #6, REGISTR                                                     ;
                                2B   11 000F3         BRB     24$
                50              07   D0 000F5 15$:    MOVL    #7, REGISTR                                                     ;
                                26   11 000F8         BRB     24$
                50              08   D0 000FA 16$:    MOVL    #8, REGISTR                                                     ;
                                21   11 000FD         BRB     24$
                50              09   D0 000FF 17$:    MOVL    #9, REGISTR                                                     ;
                                1C   11 00102         BRB     24$
                50              0A   D0 00104 18$:    MOVL    #10, REGISTR                                                    ;
                                17   11 00107         BRB     24$
                50              0B   D0 00109 19$:    MOVL    #11, REGISTR                                                    ;
                                12   11 0010C         BRB     24$
                50              0C   D0 0010E 20$:    MOVL    #12, REGISTR                                                    ;
                                0D   11 00111         BRB     24$
                50              0D   D0 00113 21$:    MOVL    #13, REGISTR                                                    ;
                                08   11 00116         BRB     24$
                50              0E   D0 00118 22$:    MOVL    #14, REGISTR                                                    ;
                                03   11 0011B         BRB     24$
                50              0F   D0 0011D 23$:    MOVL    #15, REGISTR                                                    ;
                    00000000G0040    D5 00120 24$:    TSTL    DBG$REG_VECTOR[REGISTR]                                         ; 8276
                                0C   13 00127         BEQL    25$
                66  00000000G0040    D0 00129         MOVL    DBG$REG_VALUES[REGISTR], (STACK_PTR)                            ; 8279
                                57   D6 00131         INCL    INSTRUC                                                         ; 8280
                                05   11 00133         BRB     26$                                                             ; 8276
          0000V CF                  00   FB 00135 25$:    CALLS   #0, VALSPEC_SCOPE_ERROR                                 ; 8284
             0C BC 00000000G        00   D0 0013A 26$:    MOVL    DBG$REG_VALUES+52, @FRAMEPTR                            ; 8286
                                75   11 00142         BRB     33$                                                             ; 8228
                56                  04   C2 00144 27$:    SUBL2   #4, STACK_PTR                                           ; 8297
                5A                  56   D1 00147         CMPL    STACK_PTR, OVERFLOW_POINT                               ;
                                    15   1E 0014A         BGEQU   28$                                                     ;
                    00000000'       EF   9F 0014C         PUSHAB  P.AEK                                                   ;
                                    01   DD 00152         PUSHL   #1                                                      ;
                    00028362        8F   DD 00154         PUSHL   #164706                                                 ;
00000000G           00              03   FB 0015A         CALLS   #3, LIB$SIGNAL                                          ;
                50              01   A7   9E 00161 28$:    MOVAB   1(R7), OPERAND                                          ; 8298
                66                  60   98 00165         CVTBL   (OPERAND), (STACK_PTR)                                  ; 8299
                                037E    31   00168         BRW     87$                                                     ; 8300
                56                  04   C2 0016B 29$:    SUBL2   #4, STACK_PTR                                           ; 8306
                5A                  56   D1 0016E         CMPL    STACK_PTR, OVERFLOW_POINT                               ;
                                    15   1E 00171         BGEQU   30$                                                     ;
                    00000000'       EF   9F 00173         PUSHAB  P.AEL                                                   ;
                                    01   DD 00179         PUSHL   #1                                                      ;
                    00028362        8F   DD 0017B         PUSHL   #164706                                                 ;
00000000G           00              03   FB 00181         CALLS   #3, LIB$SIGNAL                                          ;
                50              01   A7   9E 00188 30$:    MOVAB   1(R7), OPERAND                                          ; 8307
                66                  60   32 0018C         CVTWL   (OPERAND), (STACK_PTR)                                  ; 8308
                                00B7    31   0018F         BRW     43$                                                     ; 8309
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                                56              04   C2 00192 31$:     SUBL2   #4, STACK_PTR                                ; 8315
                                5A              56   D1 00195          CMPL    STACK_PTR, OVERFLOW_POINT                   ;
                                                15   1E 00198          BGEQU   32$                                         ;
                                    00000000'   EF   9F 0019A          PUSHAB  P.AEM                                       ;
                                                01   DD 001A0          PUSHL   #1                                          ;
                                    00028362    8F   DD 001A2          PUSHL   #164706                                     ;
                    00000000G   00              03   FB 001A8          CALLS   #3, LIB$SIGNAL                              ;
                                50          01  A7   9E 001AF 32$:     MOVAB   1(R7), OPERAND                              ; 8316
                                66              60   D0 001B3          MOVL    (OPERAND), (STACK_PTR)                      ; 8317
                                57              05   C0 001B6          ADDL2   #5, INSTRUC                                 ; 8318
                                                44   11 001B9 33$:     BRB     38$                                         ; 8228
                                58          01  A7   9A 001BB 34$:     MOVZBL  1(INSTRUC), R8                              ; 8329
                7E              00              58   01 7A 001BF        EMUL    #1, R8, #0, -(SP)                           ;
                50              50              8E   04 7B 001C4        EDIV    #4, (SP)+, R0, R0                           ;
                                                50   D5 001C9          TSTL    R0                                          ;
                                                06   13 001CB          BEQL    35$                                         ;
                                50              04   50 C3 001CD      SUBL3   R0, #4, R0                                  ;
                                                02   11 001D1          BRB     36$                                         ;
                                                50   D4 001D3 35$:     CLRL    R0                                          ;
                                50              58   C0 001D5 36$:     ADDL2   R8, R0                                      ;
                                56              50   C2 001D8          SUBL2   R0, STACK_PTR                               ;
                                5A              56   D1 001DB          CMPL    STACK_PTR, OVERFLOW_POINT                   ;
                                                15   1E 001DE          BGEQU   37$                                         ;
                                    00000000'   EF   9F 001E0          PUSHAB  P.AEN                                       ;
                                                01   DD 001E6          PUSHL   #1                                          ;
                                    00028362    8F   DD 001E8          PUSHL   #164706                                     ;
                    00000000G   00              03   FB 001EE          CALLS   #3, LIB$SIGNAL                              ;
                66              02          A7   58   28 001F5 37$:     MOVC3   R8, 2(INSTRUC), (STACK_PTR)                 ; 8330
                                57          02 A847  9E 001FA          MOVAB   2(R8)[INSTRUC], INSTRUC                     ; 8331
                                                4B   11 001FF 38$:     BRB     44$                                         ; 8228
                                56              04   C2 00201 39$:     SUBL2   #4, STACK_PTR                               ; 8341
                                5A              56   D1 00204          CMPL    STACK_PTR, OVERFLOW_POINT                   ;
                                                15   1E 00207          BGEQU   40$                                         ;
                                    00000000'   EF   9F 00209          PUSHAB  P.AEO                                       ;
                                                01   DD 0020F          PUSHL   #1                                          ;
                                    00028362    8F   DD 00211          PUSHL   #164706                                     ;
                    00000000G   00              03   FB 00217          CALLS   #3, LIB$SIGNAL                              ;
                                66          01  A7   9A 0021E 40$:     MOVZBL  1(INSTRUC), (STACK_PTR)                     ; 8342
                                            02C4 31   00222          BRW     87$                                         ; 8343
                                56              04   C2 00225 41$:     SUBL2   #4, STACK_PTR                               ; 8349
                                5A              56   D1 00228          CMPL    STACK_PTR, OVERFLOW_POINT                   ;
                                                15   1E 0022B          BGEQU   42$                                         ;
                                    00000000'   EF   9F 0022D          PUSHAB  P.AEP                                       ;
                                                01   DD 00233          PUSHL   #1                                          ;
                                    00028362    8F   DD 00235          PUSHL   #164706                                     ;
                    00000000G   00              03   FB 0023B          CALLS   #3, LIB$SIGNAL                              ;
                                50          01  A7   9E 00242 42$:     MOVAB   1(R7), OPERAND                              ; 8350
                                66              60   3C 00246          MOVZWL  (OPERAND), (STACK_PTR)                      ; 8351
                                57              03   C0 00249 43$:     ADDL2   #3, INSTRUC                                 ; 8352
                                            FDD4 31   0024C 44$:     BRW     1$                                          ; 8228
                                50              66   D0 0024F 45$:     MOVL    (STACK_PTR), OPERAND                        ; 8364
                                66              60   98 00252          CVTBL   (OPERAND), (STACK_PTR)                      ; 8365
                                                1E   11 00255          BRB     50$                                         ; 8366
                                50              66   D0 00257 46$:     MOVL    (STACK_PTR), OPERAND                        ; 8372
                                66              60   32 0025A          CVTWL   (OPERAND), (STACK_PTR)                      ; 8373
                                                16   11 0025D          BRB     50$                                         ; 8374
-                               50              66   D0 0025F 47$:     MOVL    (STACK_PTR), OPERAND                        ; 8380
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                66              60  D0 00262          MOVL    (OPERAND), (STACK_PTR)                  ; 8381
                                0E  11 00265          BRB     50$                                     ; 8382
                50              66  D0 00267 48$:     MOVL    (STACK_PTR), OPERAND                    ; 8394
                66              60  9A 0026A          MOVZBL  (OPERAND), (STACK_PTR)                  ; 8395
                                06  11 0026D          BRB     50$                                     ; 8396
                50              66  D0 0026F 49$:     MOVL    (STACK_PTR), OPERAND                    ; 8402
                66              60  3C 00272          MOVZWL  (OPERAND), (STACK_PTR)                  ; 8403
                            03E8  31 00275 50$:       BRW     106$                                    ; 8404
                50        08    A6  9E 00278 51$:     MOVAB   8(R6), R0                               ; 8414
                50              59  D1 0027C          CMPL    UNDERFLOW_POINT, R0
                                15  18 0027F          BGEQ    52$
                    00000000'   EF  9F 00281          PUSHAB  P.AEQ
                                01  DD 00287          PUSHL   #1
                    00028362    8F  DD 00289          PUSHL   #164706
      00000000G   00            03  FB 0028F          CALLS   #3, LIB$SIGNAL
                66              86  C0 00296 52$:     ADDL2   (STACK_PTR)+, (STACK_PTR)               ; 8415
                59              56  D1 00299          CMPL    STACK_PTR, UNDERFLOW_POINT              ; 8416
                                D7  1B 0029C          BLEQU   50$
                    00000000'   EF  9F 0029E          PUSHAB  P.AER
                                5C  11 002A4          BRB     57$
                50        08    A6  9E 002A6 53$:     MOVAB   8(R6), R0                               ; 8427
                50              59  D1 002AA          CMPL    UNDERFLOW_POINT, R0
                                15  18 002AD          BGEQ    54$
                    00000000'   EF  9F 002AF          PUSHAB  P.AES
                                01  DD 002B5          PUSHL   #1
                    00028362    8F  DD 002B7          PUSHL   #164706
      00000000G   00            03  FB 002BD          CALLS   #3, LIB$SIGNAL
66              86        04    A6  C3 002C4 54$:     SUBL3   4(STACK_PTR), (STACK_PTR)+, (STACK_PTR)  ; 8428
                59              56  D1 002C9          CMPL    STACK_PTR, UNDERFLOW_POINT              ; 8429
                                A7  1B 002CC          BLEQU   50$
                    00000000'   EF  9F 002CE          PUSHAB  P.AET
                                79  11 002D4          BRB     63$
                50        08    A6  9E 002D6 55$:     MOVAB   8(R6), R0                               ; 8440
                50              59  D1 002DA          CMPL    UNDERFLOW_POINT, R0
                                15  18 002DD          BGEQ    56$
                    00000000'   EF  9F 002DF          PUSHAB  P.AEU
                                01  DD 002E5          PUSHL   #1
                    00028362    8F  DD 002E7          PUSHL   #164706
      00000000G   00            03  FB 002ED          CALLS   #3, LIB$SIGNAL
                66              86  C4 002F4 56$:     MULL2   (STACK_PTR)+, (STACK_PTR)               ; 8441
                59              56  D1 002F7          CMPL    STACK_PTR, UNDERFLOW_POINT              ; 8442
                                4B  1B 002FA          BLEQU   62$
                    00000000'   EF  9F 002FC          PUSHAB  P.AEV
                                4B  11 00302 57$:     BRB     63$
                50        08    A6  9E 00304 58$:     MOVAB   8(R6), R0                               ; 8453
                50              59  D1 00308          CMPL    UNDERFLOW_POINT, R0
                                15  18 0030B          BGEQ    59$
                    00000000'   EF  9F 0030D          PUSHAB  P.AEW
                                01  DD 00313          PUSHL   #1
                    00028362    8F  DD 00315          PUSHL   #164706
      00000000G   00            03  FB 0031B          CALLS   #3, LIB$SIGNAL
                        04      A6  D5 00322 59$:     TSTL    4(STACK_PTR)                            ; 8454
                                18  12 00325          BNEQ    61$
                    00000000'   EF  9F 00327          PUSHAB  P.AEX                                   ; 8456
                                01  DD 0032D 60$:     PUSHL   #1
                    00028362    8F  DD 0032F          PUSHL   #164706
      00000000G   00            03  FB 00335          CALLS   #3, LIB$SIGNAL
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                                    FCE4  31 0033C          BRW     1$
                66          86        04   A6  C7 0033F 61$:  DIVL3   4(STACK_PTR), (STACK_PTR)+, (STACK_PTR)      ; 8460
                59                     56   D1 00344          CMPL    STACK_PTR, UNDERFLOW_POINT                  ; 8461
                                       52   1B 00347 62$:     BLEQU   68$
                            00000000'  EF   9F 00349          PUSHAB  P.AEY
                                       7E   11 0034F 63$:     BRB     71$
                          50        08   A6  9E 00351 64$:     MOVAB   8(R6), R0                                   ; 8474
                          50             59   D1 00355          CMPL    UNDERFLOW_POINT, R0
                                         15   18 00358          BGEQ    65$
                            00000000'  EF   9F 0035A          PUSHAB  P.AEZ
                                       01   DD 00360          PUSHL   #1
                            00028362   8F   DD 00362          PUSHL   #164706
                00000000G   00              03   FB 00368          CALLS   #3, LIB$SIGNAL
                          50             66   D0 0036F 65$:     MOVL    (STACK_PTR), R0                             ; 8475
                                         03   18 00372          BGEQ    66$
                          50             50   CE 00374          MNEGL   R0, R0
                          20             50   D1 00377 66$:     CMPL    R0, #32
                                         22   19 0037A          BLSS    69$
                          56             04   C0 0037C          ADDL2   #4, STACK_PTR                               ; 8478
                          59             56   D1 0037F          CMPL    STACK_PTR, UNDERFLOW_POINT
                                         15   1B 00382          BLEQU   67$
                            00000000'  EF   9F 00384          PUSHAB  P.AFA
                                       01   DD 0038A          PUSHL   #1
                            00028362   8F   DD 0038C          PUSHL   #164706
                00000000G   00              03   FB 00392          CALLS   #3, LIB$SIGNAL
                                       66   D4 00399 67$:     CLRL    (STACK_PTR)                                 ; 8479
                                  02C2 31   0039B 68$:     BRW     106$                                        ; 8475
                                       66   D5 0039E 69$:     TSTL    (STACK_PTR)                                 ; 8484
                                       16   15 003A0          BLEQ    70$
          03    A6        03    A6          86   78 003A2          ASHL    (STACK_PTR)+, 3(STACK_PTR), 3(STACK_PTR)    ; 8490
                          56             03   C0 003A8          ADDL2   #3, STACK_PTR                               ; 8491
                          59             56   D1 003AB          CMPL    STACK_PTR, UNDERFLOW_POINT
                                         EB   1B 003AE          BLEQU   68$
                            00000000'  EF   9F 003B0          PUSHAB  P.AFB
                                       17   11 003B6          BRB     71$
                          51             86   CE 003B8 70$:     MNEGL   (STACK_PTR)+, POSITION                      ; 8503
                    50    20             51   C3 003BB          SUBL3   POSITION, #32, SIZ                          ; 8504
          66        66    50             51   EF 003BF          EXTZV   POSITION, SIZ, (STACK_PTR), (STACK_PTR)     ; 8505
                          59             56   D1 003C4          CMPL    STACK_PTR, UNDERFLOW_POINT                  ; 8506
                                         D2   1B 003C7          BLEQU   68$
                            00000000'  EF   9F 003C9          PUSHAB  P.AFC
                                       6D   11 003CF 71$:     BRB     74$
                          50        08   A6  9E 003D1 72$:     MOVAB   8(R6), R0                                   ; 8521
                          50             59   D1 003D5          CMPL    UNDERFLOW_POINT, R0
                                         15   18 003D8          BGEQ    73$
                            00000000'  EF   9F 003DA          PUSHAB  P.AFD
                                       01   DD 003E0          PUSHL   #1
                            00028362   8F   DD 003E2          PUSHL   #164706
                00000000G   00              03   FB 003E8          CALLS   #3, LIB$SIGNAL
          7E    00          66              01   7A 003EF 73$:     EMUL    #1, (STACK_PTR), #0, -(SP)                  ; 8522
          50    50          8E              20   7B 003F4          EDIV    #32, (SP)+, BITS_TO_ROT, BITS_TO_ROT
                          54        04   A6  9E 003F9          MOVAB   4(STACK_PTR), R4                            ; 8530
                    53    20             50   C3 003FD          SUBL3   BITS_TO_ROT, #32, R3                        ; 8560
                                         50   D5 00401          TSTL    BITS_TO_ROT                                 ; 8523
                                         3B   15 00403          BLEQ    75$
                          58             64   D0 00405          MOVL    (R4), OPERAND                               ; 8530
                          6E             50   D0 00408          MOVL    BITS_TO_ROT, TARG_POS                       ; 8551
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                                55  D4 0040B          CLRL    SRC_POS                                 ; 8552
                          51    E0  AE 9E 0040D          MOVAB   TARG_POS-32, SIZ                        ; 8553
                          51        51 CE 00411          MNEGL   SIZ, SIZ                                ;
          52        58    51        55 EF 00414          EXTZV   SRC_POS, SIZ, OPERAND, R2               ; 8554
          64        51    6E        52 F0 00419          INSV    R2, TARG_POS, SIZ, (R4)                 ;
                          6E        D4 0041E             CLRL    TARG_POS                                ; 8559
                          55        53 D0 00420          MOVL    R3, SRC_POS                             ; 8560
                          51        50 D0 00423          MOVL    BITS_TO_ROT, SIZ                        ; 8561
          50        58    51        55 EF 00426          EXTZV   SRC_POS, SIZ, OPERAND, R0               ; 8562
          64        51    6E        50 F0 0042B          INSV    R0, TARG_POS, SIZ, (R4)                 ;
                          56        04 C0 00430          ADDL2   #4, STACK_PTR                           ; 8566
                          59        56 D1 00433          CMPL    STACK_PTR, UNDERFLOW_POINT              ;
                                    6E 1B 00436          BLEQU   80$                                     ;
                    00000000'     EF 9F 00438          PUSHAB  P.AFE                                   ;
                                    35 11 0043E 74$:     BRB     76$                                     ;
                          5B        64 D0 00440 75$:     MOVL    (R4), OPERAND                           ; 8576
                          58        53 D0 00443          MOVL    R3, TARG_POS                            ; 8597
                                    55 D4 00446          CLRL    SRC_POS                                 ; 8598
                          51        50 D0 00448          MOVL    BITS_TO_ROT, SIZ                        ; 8599
          52        5B    51        55 EF 0044B          EXTZV   SRC_POS, SIZ, OPERAND, R2               ; 8600
          64        51    58        52 F0 00450          INSV    R2, TARG_POS, SIZ, (R4)                 ;
                                    58 D4 00455          CLRL    TARG_POS                                ; 8606
                          55        50 D0 00457          MOVL    BITS_TO_ROT, SRC_POS                    ; 8607
                          51        53 D0 0045A          MOVL    R3, SIZ                                 ; 8608
          52        5B    51        55 EF 0045D          EXTZV   SRC_POS, SIZ, OPERAND, R2               ; 8609
          64        51    58        52 F0 00462          INSV    R2, TARG_POS, SIZ, (R4)                 ;
                          56        04 C0 00467          ADDL2   #4, STACK_PTR                           ; 8614
                          59        56 D1 0046A          CMPL    STACK_PTR, UNDERFLOW_POINT              ;
                                    37 1B 0046D          BLEQU   80$                                     ;
                    00000000'     EF 9F 0046F          PUSHAB  P.AFF                                   ;
                              0085    31 00475 76$:      BRW     89$                                     ;
                          56        04 C2 00478 77$:     SUBL2   #4, STACK_PTR                           ; 8625
                          5A        56 D1 0047B          CMPL    STACK_PTR, OVERFLOW_POINT               ;
                                    15 1E 0047E          BGEQU   78$                                     ;
                    00000000'     EF 9F 00480          PUSHAB  P.AFG                                   ;
                                    01 DD 00486          PUSHL   #1                                      ;
                    00028362      8F DD 00488          PUSHL   #164706                                 ;
          00000000G 00              03 FB 0048E          CALLS   #3, LIB$SIGNAL                          ;
                          66    04  A6 D0 00495 78$:     MOVL    4(STACK_PTR), (STACK_PTR)               ; 8626
                                    71 11 00499          BRB     90$                                     ; 8627
                          50        66 D0 0049B 79$:     MOVL    (STACK_PTR), WORK_CELL                  ; 8636
                          66    04  A6 D0 0049E          MOVL    4(STACK_PTR), (STACK_PTR)               ; 8637
                    04    A6        50 D0 004A2          MOVL    WORK_CELL, 4(STACK_PTR)                 ; 8638
                                    64 11 004A6 80$:     BRB     90$                                     ; 8639
                          50    01  A7 9A 004A8 81$:     MOVZBL  1(INSTRUC), R0                          ; 8666
                          51    04 A046 9E 004AC         MOVAB   4(R0)[STACK_PTR], TARGET                ;
          02                      67 8F 004B1          CASEB   (INSTRUC), #36, #2                      ; 8668
    0010                  000B      0006     004B5 82$:  .WORD   83$-82$,-                               ;
                                                                  84$-82$,-                               ;
                                                                  85$-82$                                 ;
                          50            01 D0 004BB 83$:  MOVL    #1, SIZ                               ;
                                        08 11 004BE       BRB     86$                                   ;
                          50            02 D0 004C0 84$:  MOVL    #2, SIZ                               ;
                                        03 11 004C3       BRB     86$                                   ;
                          50            04 D0 004C5 85$:  MOVL    #4, SIZ                               ;
              61          66            50 28 004C8 86$:  MOVC3   SIZ, (STACK_PTR), (TARGET)            ; 8674
                          56            04 C0 004CC       ADDL2   #4, STACK_PTR                         ; 8675
```

```
                59              56  D1 004CF          CMPL    STACK_PTR, UNDERFLOW_POINT                      ;
                                15  1B 004D2          BLEQU   87$                                             ;
                    00000000'   EF  9F 004D4          PUSHAB  P.AFH                                           ;
                                01  DD 004DA          PUSHL   #1                                              ;
                    00028362    8F  DD 004DC          PUSHL   #164706                                         ;
            00000000G   00          03  FB 004E2          CALLS   #3, LIB$SIGNAL                              ;
                57              02  C0 004E9 87$:     ADDL2   #2, INSTRUC                                     ; 8676
                          FB34  31  00 004EC          BRW     1$                                              ; 8228
                56              04  C0 004EF 88$:     ADDL2   #4, STACK_PTR                                   ; 8685
                59              56  D1 004F2          CMPL    STACK_PTR, UNDERFLOW_POINT                      ;
                                15  1B 004F5          BLEQU   90$                                             ;
                    00000000'   EF  9F 004F7          PUSHAB  P.AFI                                           ;
                                01  DD 004FD 89$:     PUSHL   #1                                              ;
                    00028362    8F  DD 004FF          PUSHL   #164706                                         ;
            00000000G   00          03  FB 00505          CALLS   #3, LIB$SIGNAL                              ;
                          0151  31  00 0050C 90$:     BRW     106$                                            ; 8686
                52              86  D0 0050F 91$:     MOVL    (STACK_PTR)+, TEMP_THUNK_ADDR                   ; 8701
                        04      AE  D4 00512          CLRL    CALL_RESULT                                     ; 8702
                59              56  D1 00515          CMPL    STACR_PTR, UNDERFLOW_POINT                      ; 8703
                                15  1B 00518          BLEQU   92$                                             ;
                    00000000'   EF  9F 0051A          PUSHAB  P.AFJ                                           ;
                                01  DD 00520          PUSHL   #1                                              ;
                    00028362    8F  DD 00522          PUSHL   #164706                                         ;
            00000000G   00          03  FB 00528          CALLS   #3, LIB$SIGNAL                              ;
        7E      59              56  C3 0052F 92$:     SUBL3   STACK_PTR, UNDERFLOW_POINT, -(SP)               ; 8705
                                56  DD 00533          PUSHL   STACK_PTR                                       ;
                                01  DD 00535          PUSHL   #1                                              ; 8704
                                7E  D4 00537          CLRL    -(SP)                                           ;
                                52  DD 00539          PUSHL   TEMP_THUNK_ADDR                                 ;
                        18      AE  9F 0053B          PUSHAB  CALL_RESULT                                     ;
                0000V   CF              06  FB 0053E          CALLS   #6, VALSPEC_ROUT_CALL                   ;
                56              04  C2 00543          SUBL2   #4, STACK_PTR                                   ; 8706
                5A              56  D1 00546          CMPL    STACK_PTR, OVERFLOW_POINT                       ;
                                57  1E 00549          BGEQU   96$                                             ;
                    00000000'   EF  9F 0054B          PUSHAB  P.AFK                                           ;
                                40  11 00551          BRB     95$                                             ;
                52              86  D0 00553 93$:     MOVL    (STACK_PTR)+, TEMP_THUNK_ADDR                   ; 8722
                        04      AE  D4 00556          CLRL    CALL_RESULT                                     ; 8723
                59              56  D1 00559          CMPL    STACK_PTR, UNDERFLOW_POINT                      ; 8724
                                15  1B 0055C          BLEQU   94$                                             ;
                    00000000'   EF  9F 0055E          PUSHAB  P.AFL                                           ;
                                01  DD 00564          PUSHL   #1                                              ;
                    00028362    8F  DD 00566          PUSHL   #164706                                         ;
            00000000G   00          03  FB 0056C          CALLS   #3, LIB$SIGNAL                              ;
        7E      59              56  C3 00573 94$:     SUBL3   STACK_PTR, UNDERFLOW_POINT, -(SP)               ; 8726
                                56  DD 00577          PUSHL   STACK_PTR                                       ;
                                7E  7C 00579          CLRQ    -(SP)                                           ; 8725
                                52  DD 0057B          PUSHL   TEMP_THUNK_ADDR                                 ;
                        18      AE  9F 0057D          PUSHAB  CALL_RESULT                                     ;
                0000V   CF              06  FB 00580          CALLS   #6, VALSPEC_ROUT_CALL                   ;
                56              04  C2 00585          SUBL2   #4, STACK_PTR                                   ; 8727
                5A              56  D1 00588          CMPL    STACK_PTR, OVERFLOW_POINT                       ;
                                15  1E 0058B          BGEQU   96$                                             ;
                    00000000'   EF  9F 0058D          PUSHAB  P.AFM                                           ;
                                01  DD 00593 95$:     PUSHL   #1                                              ;
                    00028362    8F  DD 00595          PUSHL   #164706                                         ;
            00000000G   00          03  FB 0059B          CALLS   #3, LIB$SIGNAL                              ;
```

```
                    66        04   AE   D0 005A2 96$:    MOVL    CALL_RESULT, (STACK_PTR)                ; 8728
                                   59   11 005A6         BRB     100$                                    ; 8729
                    52             86   D0 005A8 97$:    MOVL    (STACK_PTR)+, TEMP_THUNK_ADDR           ; 8746
                              08   AE   7C 005AB         CLRQ    CALL_RESULT                             ; 8747
                              10   AE   7C 005AE         CLRQ    CALL_RESULT+8                           ; 8749
                    59             56   D1 005B1         CMPL    STACK_PTR, UNDERFLOW_POINT              ; 8751
                                   15   1B 005B4         BLEQU   98$
                         00000000' EF   9F 005B6         PUSHAB  P.AFN
                                   01   DD 005BC         PUSHL   #1
                         00028362  8F   DD 005BE         PUSHL   #164706
              00000000G  00        03   FB 005C4         CALLS   #3, LIB$SIGNAL
        7E    59                   56   C3 005CB 98$:    SUBL3   STACK_PTR, UNDERFLOW_POINT, -(SP)       ; 8753
                                   56   DD 005CF         PUSHL   STACK_PTR
                                   01   DD 005D1         PUSHL   #1                                      ; 8752
                                   01   DD 005D3         PUSHL   #1
                                   52   DD 005D5         PUSHL   TEMP_THUNK_ADDR
                              1C   AE   9F 005D7         PUSHAB  CALL_RESULT
                    0000V     CF   06   FB 005DA         CALLS   #6, VALSPEC_ROUT_CALL
                    56             10   C2 005DF         SUBL2   #16, STACK_PTR                          ; 8754
                    5A             56   D1 005E2         CMPL    STACK_PTR, OVERFLOW_POINT
                                   15   1E 005E5         BGEQU   99$
                         00000000' EF   9F 005E7         PUSHAB  P.AFO
                                   01   DD 005ED         PUSHL   #1
                         00028362  8F   DD 005EF         PUSHL   #164706
              00000000G  00        03   FB 005F5         CALLS   #3, LIB$SIGNAL
        66        08   AE             10   28 005FC 99$:    MOVC3   #16, CALL_RESULT, (STACK_PTR)           ; 8755
                  0C   BC 00000000G   00   D0 00601 100$:   MOVL    DBG$REG_VALUES+52, @FRAMEPTR            ; 8756
                                   55   11 00609         BRB     106$                                    ; 8757
                    56             04   C2 0060B 101$:   SUBL2   #4, STACK_PTR                          ; 8777
                    5A             56   D1 0060E         CMPL    STACK_PTR, OVERFLOW_POINT
                                   15   1E 00611         BGEQU   102$
                         00000000' EF   9F 00613         PUSHAB  P.AFP
                                   01   DD 00619         PUSHL   #1
                         00028362  8F   DD 0061B         PUSHL   #164706
              00000000G  00        03   FB 00621         CALLS   #3, LIB$SIGNAL
                         00000000G 00   DD 00628 102$:    PUSHL   DBG$GL_CURRENT_PRIMARY                  ; 8778
                    C76A  CF             01   FB 0062E         CALLS   #1, DBG$GET_OUTER_REC_ADDRESS
                                   28   11 00633         BRB     105$
                    56             04   C2 00635 103$:   SUBL2   #4, STACK_PTR                          ; 8791
                    5A             56   D1 00638         CMPL    STACK_PTR, OVERFLOW_POINT
                                   15   1E 0063B         BGEQU   104$
                         00000000' EF   9F 0063D         PUSHAB  P.AFQ
                                   01   DD 00643         PUSHL   #1
                         00028362  8F   DD 00645         PUSHL   #164706
              00000000G  00        03   FB 0064B         CALLS   #3, LIB$SIGNAL
                         00000000G 00   DD 00652 104$:    PUSHL   DBG$GL_CURRENT_PRIMARY                  ; 8792
                    C733  CF             01   FB 00658         CALLS   #1, DBG$GET_INNER_REC_ADDRESS
                    66             50   D0 0065D 105$:   MOVL    R0, (STACK_PTR)
                                   57   D6 00660 106$:   INCL    INSTRUC                                 ; 8793
                              F9BE 31   00662         BRW     1$                                      ; 8221
                      08   BC        56   D0 00665 107$:   MOVL    STACK_PTR, @RESULT_PTR                  ; 8809
                                        04 00669         RET                                             ; 8812

; Routine Size:  1642 bytes,    Routine Base:  DBG$CODE + 33D1
```

```
;  8728          8813  1 ROUTINE VALSPEC_ERROR_HANDLER(SIGARG, MECHARG, ENBLARG) =
;  8729          8814  1 !
;  8730          8815  1 ! FUNCTION
;  8731          8816  1 !       This routine is the error handler for the DBG$STA_VALSPEC routine.  It
;  8732          8817  1 !       handles Access Violations which occur during the evaluation of DST Value
;  8733          8818  1 !       Specs.  Since such access violations are not normally caused by errors
;  8734          8819  1 !       in Debug but rather by errors in the user program (e.g., by clobbered
;  8735          8820  1 !       registers), we give a special message for this kind of access violation.
;  8736          8821  1 !       The message says that the error occurred in the address computation for
;  8737          8822  1 !       some symbol and gives the symbol name.  The symbol name comes from the
;  8738          8823  1 !       SYMID last passed to DBG$STA_SETCONTEXT.
;  8739          8824  1 !
;  8740          8825  1 ! INPUTS
;  8741          8826  1 !       SIGARG  - The signal argument vector.
;  8742          8827  1 !
;  8743          8828  1 !       MECHARG - The mechanism argument vector.
;  8744          8829  1 !
;  8745          8830  1 !       ENBLARG - The enable argument vector (not used here).
;  8746          8831  1 !
;  8747          8832  1 ! OUTPUTS
;  8748          8833  1 !       For the SS$_ACCVIO error, the DBG$_ACCADDCOM error is signalled instead.
;  8749          8834  1 !       For all other errors, this routine just resignals.
;  8750          8835  1 !
;  8751          8836  1
;  8752          8837  2     BEGIN
;  8753          8838  2
;  8754          8839  2     MAP
;  8755          8840  2         SIGARG: REF VECTOR[,LONG];      ! Pointer to the signal argument vector
;  8756          8841  2
;  8757          8842  2     LOCAL
;  8758          8843  2         PATHDESCR,                      ! Pointer to pathname descriptor
;  8759          8844  2         PATHSTRING;                     ! Pointer to pathname string for symbol
;  8760          8845  2
;  8761          8846  2
;  8762          8847  2
;  8763          8848  2     ! If this is anything other than an access violation, just resignal it.
;  8764          8849  2     !
;  8765          8850  2     IF .SIGARG[1] NEQ SS$_ACCVIO THEN RETURN SS$_RESIGNAL;
;  8766          8851  2
;  8767          8852  2
;  8768          8853  2     ! It is an access violation.  Determine the name of the last symbol passed
;  8769          8854  2     ! to DBG$STA_SETCONTEXT to set up the register context and use that in the
;  8770          8855  2     ! error message we substitute.
;  8771          8856  2     !
;  8772          8857  2     IF .DBG$REG_SYMID EQL 0
;  8773          8858  2     THEN
;  8774          8859  2         PATHSTRING = UPLIT BYTE(%ASCIC 'object')
;  8775          8860  2
;  8776          8861  2     ELSE
;  8777          8862  3         BEGIN
;  8778          8863  3         DBG$STA_SYMPATHNAME(.DBG$REG_SYMID, PATHDESCR);
;  8779          8864  3         DBG$NPATHDESC_TO_CS(.PATHDESCR, PATHSTRING);
;  8780          8865  2         END;
;  8781          8866  2
;  8782          8867  2
;  8783          8868  2     ! Signal the substitute error.  We never get control back from the signal.
;  8784          8869  2     !
```

```
;  8785          8870  2     SIGNAL(DBG$_ACCADDCOM, 1, .PATHSTRING);
;  8786          8871  2     RETURN 0;
;  8787          8872  2
;  8788          8873  1     END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

            74  63  65  6A  62  6F  06  00937 P.AFS:     .ASCII  <6>\object\                                     ;


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                    0000 00000 VALSPEC_ERROR_HANDLER:
                                                        .WORD   Save nothing                                    ; 8813
                    5E                  08  C2 00002      SUBL2   #8, SP                                      ;
                    50              04  AC  D0 00005      MOVL    SIGARG, R0                                  ; 8850
                    0C              04  A0  D1 00009      CMPL    4(R0), #12                                  ;
                                        06  13 0000D      BEQL    1$                                          ;
                    50          0918    8F  3C 0000F      MOVZWL  #2328, R0                                   ;
                                        04  00014         RET                                                 ;
                    50 00000000'        EF  D0 00015 1$:  MOVL    DBG$REG_SYMID, R0                           ; 8857
                                        0A  12 0001C      BNEQ    2$                                          ;
                  04    AE 00000000'    EF  9E 0001E      MOVAB   P.AFS, PATHSTRING                           ; 8859
                                        16  11 00026      BRB     3$                                          ;
                            4001        8F  BB 00028 2$:  PUSHR   #^M<R0,SP>                                 ; 8863
                E223    CF              02  FB 0002C      CALLS   #2, DBG$STA_SYMPATHNAME                     ;
                              04    AE  9F  00031         PUSHAB  PATHSTRING                                  ; 8864
                              04    AE  DD  00034         PUSHL   PATHDESCR                                   ;
            00000000G   00              02  FB 00037      CALLS   #2, DBG$NPATHDESC_TO_CS                     ;
                              04    AE  DD  0003E 3$:     PUSHL   PATHSTRING                                  ; 8870
                                        01  DD 00041      PUSHL   #1                                          ;
                                00028C98    8F  DD 00043  PUSHL   #167064                                     ;
                        00000000G   00      03  FB 00049  CALLS   #3, LIB$SIGNAL                             ;
                                        50  D4 00050      CLRL    R0                                          ; 8871
                                        04  00052         RET                                                 ; 8873

; Routine Size:  83 bytes,    Routine Base:  DBG$CODE + 3A3B
```

```
;  8790          8874  1 ROUTINE VALSPEC_SCOPE_ERROR: NOVALUE =
;  8791          8875  1 !
;  8792          8876  1 ! FUNCTION
;  8793          8877  1 !       This routine is called during DST Value Spec evaluation if a register
;  8794          8878  1 !       is referenced which is not available in the current context as set by
;  8795          8879  1 !       routine DBG$STA_SETCONTEXT.  Use of such a register usually means that
;  8796          8880  1 !       a variable is being referenced whose scope is not currently active, i.e.
;  8797          8881  1 !       there is no CALL frame on the VAX stack for the routine in which the
;  8798          8882  1 !       symbol is declared.  This routine just sets up and signals the "Symbol
;  8799          8883  1 !       not in active scope" error message.
;  8800          8884  1 !
;  8801          8885  1 ! INPUTS
;  8802          8886  1 !       DBG$REG_SYMID is an implicit input.  It gives the SYMID of the symbol
;  8803          8887  1 !       last used to establish context.  There are no input parameters.
;  8804          8888  1 !
;  8805          8889  1 ! OUTPUTS
;  8806          8890  1 !       NONE
;  8807          8891  1 !
;  8808          8892  1
;  8809          8893  2     BEGIN
;  8810          8894  2
;  8811          8895  2     LOCAL
;  8812          8896  2         PATHNAME,                       ! Pointer to symbol's pathname descriptor
;  8813          8897  2         PATHSTRING;                     ! Pointer to symbol's pathname string
;  8814          8898  2
;  8815          8899  2
;  8816          8900  2
;  8817          8901  2     ! Use the SYMID passed to DBG$STA_SETCONTEXT last to format the symbol name
;  8818          8902  2     ! for the error message.  If no such name exists, use the null string.
;  8819          8903  2     !
;  8820          8904  2     IF .DBG$REG_SYMID EQL 0
;  8821          8905  2     THEN
;  8822          8906  2         PATHSTRING = UPLIT(0)
;  8823          8907  2
;  8824          8908  2     ELSE
;  8825          8909  3         BEGIN
;  8826          8910  3         DBG$STA_SYMPATHNAME(.DBG$REG_SYMID, PATHNAME);
;  8827          8911  3         DBG$NPATHDESC_TO_CS(.PATHNAME, PATHSTRING);
;  8828          8912  2         END;
;  8829          8913  2
;  8830          8914  2
;  8831          8915  2     ! Signal the error--we do not return from the signal.
;  8832          8916  2     !
;  8833          8917  2     SIGNAL(DBG$_SYMNOTACT, 1, .PATHSTRING);
;  8834          8918  2
;  8835          8919  1     END;


                                                .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

                                        0093E   .BLKB   2
                                00000000 00940 P.AFT:   .LONG   0                       ;


                                                .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0
```

```
                                 0000 00000 VALSPEC_SCOPE_ERROR:
                                                .WORD   Save nothing                            ; 8874
                         5E                 08  C2 00002          SUBL2   #8, SP
                         50 00000000'       EF  D0 00005          MOVL    DBG$REG_SYMID, R0
                                            0A  12 0000C          BNEQ    1$
                      04 AE 00000000'       EF  9E 0000E          MOVAB   P.AFT, PATHSTRING       ; 8906
                                            16  11 00016          BRB     2$
                            4001            8F  BB 00018 1$:      PUSHR   #^M<R0,SP>              ; 8910
                    E1E0 CF                 02  FB 0001C          CALLS   #2, DBG$STA_SYMPATHNAME
                               04 AE        9F  00021            PUSHAB  PATHSTRING              ; 8911
                               04 AE        DD  00024            PUSHL   PATHNAME
                00000000G 00                02  FB 00027          CALLS   #2, DBG$NPATHDESC_TO_CS
                               04 AE        DD  0002E 2$:        PUSHL   PATHSTRING              ; 8917
                                            01  DD 00031          PUSHL   #1
                         00028C88           8F  DD 00033          PUSHL   #167048
                00000000G 00                03  FB 00039          CALLS   #3, LIB$SIGNAL
                                            04  00040          RET                             ; 8919

; Routine Size:  65 bytes,    Routine Base:  DBG$CODE + 3A8E
```

```
;  8837          8920  1 ROUTINE VALSPEC_ROUT_CALL(      VALBUFFER,
;  8838          8921  1                                 ROUT_ADDR,
;  8839          8922  1                                 OCTAWORD_FLAG,
;  8840          8923  1                                 FP_FLAG,
;  8841          8924  1                                 STACK_TOP,
;  8842          8925  1                                 STACK_LENGTH) : NOVALUE =
;  8843          8926  1 !
;  8844          8927  1 ! FUNCTION
;  8845          8928  1 !       This routine is called to handle calls on compiler-supplied routines
;  8846          8929  1 !       in the user's address-space during Value Spec evaluation.  Calls to
;  8847          8930  1 !       compiler-supplied Value Spec routines can be specified in Materializa-
;  8848          8931  1 !       tion Specs in Value Specs, both directly and via the DST Stack Machine.
;  8849          8932  1 !       The compiler-supplied routine is called as follows:
;  8850          8933  1 !
;  8851          8934  1 !               - The desired symbol's Frame Pointer value is passed to
;  8852          8935  1 !                 the routine in register R1.
;  8853          8936  1 !
;  8854          8937  1 !               - If OCTAWORD_FLAG is FALSE, a pointer to the vector of
;  8855          8938  1 !                 register values for the symbol's frame (as represented
;  8856          8939  1 !                 by DBG$REG_VALUES) is passed as a parameter in the argu-
;  8857          8940  1 !                 ment vector, and the routine returns the symbol's value
;  8858          8941  1 !                 in register R0.
;  8859          8942  1 !
;  8860          8943  1 !               - If OCTAWORD_FLAG is TRUE, a pointer to a 4-longword result
;  8861          8944  1 !                 buffer and a pointer to the vector of register values in
;  8862          8945  1 !                 the symbol's frame are passed as parameters in the argument
;  8863          8946  1 !                 vector.  The routine's result is returned directly to the
;  8864          8947  1 !                 result buffer in this case, and not through register R0.
;  8865          8948  1 !
;  8866          8949  1 !               - When STACK_TOP and STACK_LENGTH are passed they are passed
;  8867          8950  1 !                 as the 2nd and 3rd parameters if the OCTAWORD_FLAG is false
;  8868          8951  1 !                 and the 3rd and 4th parameters if the OCTAWORD_FLAG is true.
;  8869          8952  1 !
;  8870          8953  1 !       If the Frame Pointer (FP) is not available in the current context (as
;  8871          8954  1 !       set up by DBG$STA_SETCONTEXT), the "symbol not in active scope" error
;  8872          8955  1 !       is signalled.  Otherwise the compiler-supplied routine is called as
;  8873          8956  1 !       described above and its value returned.  The routine that called
;  8874          8957  1 !       VALSPEC_ROUT_CALL can then use the value as it sees fit.
;  8875          8958  1 !
;  8876          8959  1 ! INPUTS
;  8877          8960  1 !       VALBUFFER - The address of a 1-longword or 4-longword buffer which is
;  8878          8961  1 !                   to receive the value returned by the called routine.  The
;  8879          8962  1 !                   size of the buffer depends on the value of OCTAWORD_FLAG.
;  8880          8963  1 !                   The buffer should be zeroed out by the caller.
;  8881          8964  1 !
;  8882          8965  1 !       ROUT_ADDR - The address of the routine to be called to get the value.
;  8883          8966  1 !
;  8884          8967  1 !       OCTAWORD_FLAG - A flag value set to TRUE if the called routine is
;  8885          8968  1 !                   expected to return a 4-longword value to VALBUFFER.  If
;  8886          8969  1 !                   this flag is FALSE, a single longword is expected to be
;  8887          8970  1 !                   returned to VALBUFFER.  If OCTAWORD_FLAG is TRUE, the called
;  8888          8971  1 !                   routine is expected to return its value to the address given
;  8889          8972  1 !                   by the first parameter;  otherwise, the value is returned in
;  8890          8973  1 !                   register R0.
;  8891          8974  1 !
;  8892          8975  1 !       FP_FLAG   - If TRUE, indicates that FP is to be passed in to thunk.
;  8893          8976  1 !
```

```
;  8894          8977  1 !       STACK_TOP - Optional parameter.  Pointer to the top of the stack
;  8895          8978  1 !                   in the stack machine. Passed by value.
;  8896          8979  1 !
;  8897          8980  1 !       STACK_LENGTH - Optional parameter. The number of bytes on the stack
;  8898          8981  1 !                   in the stack machine. Passed by value.
;  8899          8982  1 !
;  8900          8983  1 ! OUTPUTS
;  8901          8984  1 !       VALBUFFER - The value returned by the called compiler-supplied
;  8902          8985  1 !                   routine is returned to the buffer pointed to by
;  8903          8986  1 !                   VALBUFFER.
;  8904          8987  1 !
;  8905          8988  1 !       No routine value is returned.
;  8906          8989  1 !
;  8907          8990  1
;  8908          8991  2     BEGIN
;  8909          8992  2
;  8910          8993  2     BUILTIN
;  8911          8994  2         ACTUALCOUNT,
;  8912          8995  2         ACTUALPARAMETER;
;  8913          8996  2
;  8914          8997  2     MAP
;  8915          8998  2         VALBUFFER: REF VECTOR[,LONG];   ! Pointer to buffer to receive value
;  8916          8999  2
;  8917          9000  2     ENABLE
;  8918          9001  2         VALSPEC_ROUT_CALL_HANDLER;      ! Set up a handler for this routine
;  8919          9002  2
;  8920          9003  2
;  8921          9004  2     ! Define the linkage by which we call the compiler-supplied routine.
;  8922          9005  2     !
;  8923          9006  2     LINKAGE
;  8924          9007  2         ROUT_CALL_LINKAGE = CALL(REGISTER = 1, STANDARD);
;  8925          9008  2
;  8926          9009  2     BIND ROUTINE
;  8927          9010  2         ROUTINE_TO_CALL = (.ROUT_ADDR): ROUT_CALL_LINKAGE;
;  8928          9011  2
;  8929          9012  2     !++
;  8930          9013  2     ! 4 parameters not allowed
;  8931          9014  2     !--
;  8932          9015  2     IF ACTUALCOUNT() EQL 5
;  8933          9016  2     THEN
;  8934          9017  2         $DBG_ERROR('RSTACCESS\VALSPEC_ROUT_CALL');
;  8935          9018  2
;  8936          9019  2
;  8937          9020  2     ! Make sure there is a current register set to take FP from.
;  8938          9021  2     !
;  8939          9022  2     IF .FP_FLAG
;  8940          9023  2     THEN
;  8941          9024  2         IF .DBG$REG_VECTOR[13] EQL 0 THEN VALSPEC_SCOPE_ERROR();
;  8942          9025  2
;  8943          9026  2
;  8944          9027  2     ! Call the compiler-provided routine to compute the desired value.  If the
;  8945          9028  2     ! octaword flag is set, we pass the buffer to receive the value (up to four
;  8946          9029  2     ! longwords) as the first parameter.  Otherwise we get the value from R0.
;  8947          9030  2     ! The frame pointer value is always passed in in register R1.
;  8948          9031  2     !
;  8949          9032  2     IF ACTUALCOUNT() EQL 4
;  8950          9033  2     THEN
```

```
;  8951          9034  2          IF .OCTAWORD_FLAG
;  8952          9035  2          THEN
;  8953          9036  2              ROUTINE_TO_CALL(.DBG$REG_VALUES[13], .VALBUFFER, DBG$REG_VALUES[0])
;  8954          9037  2          ELSE
;  8955          9038  2              VALBUFFER[0] = ROUTINE_TO_CALL(.DBG$REG_VALUES[13], DBG$REG_VALUES[0])
;  8956          9039  2      ELSE
;  8957          9040  2          IF .OCTAWORD_FLAG
;  8958          9041  2          THEN
;  8959          9042  2              ROUTINE_TO_CALL(.DBG$REG_VALUES[13], .VALBUFFER, DBG$REG_VALUES[0], .STACK_TOP, .STACK_LENGTH)
;  8960          9043  2          ELSE
;  8961          9044  2              VALBUFFER[0] = ROUTINE_TO_CALL(.DBG$REG_VALUES[13], DBG$REG_VALUES[0], .STACK_TOP, .STACK_LENGTH
;  8962          9045  2
;  8963          9046  2      RETURN;
;  8964          9047  2
;  8965          9048  1      END;


                                                        .PSECT  DBG$PLIT,NOWRT,  SHR,  PIC,0

53  4C  41  56  5C  53  53  45  43  43  41  54  53  52  1B  00944 P.AFU:  .ASCII  <27>\RSTACCESS\<92>\VALSPEC_ROUT_CALL\      ;
        4C  4C  41  43  5F  54  55  4F  52  5F  43  45  50  00953                                                              ;


                                                        .PSECT  DBG$CODE,NOWRT,  SHR,  PIC,0

                                            000C 00000 VALSPEC_ROUT_CALL:
                                                        .WORD   Save R2,R3                                                  ; 8920
                    53 00000000G   00   9E 00002        MOVAB   DBG$REG_VALUES, R3                                          ;
                    6D      0077   CF   DE 00009        MOVAL   7$, (FP)                                                    ; 8991
                    05             6C   91 0000E        CMPB    (AP), #5                                                    ; 9015
                                   15   12 00011        BNEQ    1$                                                          ;
                           00000000'   EF   9F 00013        PUSHAB  P.AFU                                                   ; 9017
                                       01   DD 00019        PUSHL   #1                                                      ;
                           00028362    8F   DD 0001B        PUSHL   #164706                                                 ;
00000000G   00                         03   FB 00021        CALLS   #3, LIB$SIGNAL                                          ;
                    0C          10     AC   E9 00028 1$:    BLBC    FP_FLAG, 2$                                             ; 9022
                           00000000G   00   D5 0002C        TSTL    DBG$REG_VECTOR+52                                       ; 9024
                                       04   12 00032        BNEQ    2$                                                      ;
                87  AF                 00   FB 00034        CALLS   #0, VALSPEC_SCOPE_ERROR                                 ;
                    52          34     A3   D0 00038 2$:    MOVL    DBG$REG_VALUES+52, R2                                   ; 9036
                    04                 6C   91 0003C        CMPB    (AP), #4                                                ; 9032
                                       1C   12 0003F        BNEQ    4$                                                      ;
                    0D          0C     AC   E9 00041        BLBC    OCTAWORD_FLAG, 3$                                       ; 9034
                                       53   DD 00045        PUSHL   R3                                                      ; 9036
                                04     AC   DD 00047        PUSHL   VALBUFFER                                               ;
                    51                 52   D0 0004A        MOVL    R2, R1                                                  ;
                08  BC                 02   FB 0004D        CALLS   #2, @ROUT_ADDR                                          ;
                                       04   00051        RET                                                             ;
                                       53   DD 00052 3$:    PUSHL   R3                                                      ; 9038
                    51                 52   D0 00054        MOVL    R2, R1                                                  ;
                08  BC                 01   FB 00057        CALLS   #1, @ROUT_ADDR                                          ;
                                       22   11 0005B        BRB     6$                                                      ;
                    11          0C     AC   E9 0005D 4$:    BLBC    OCTAWORD_FLAG, 5$                                       ; 9042
                    7E          14     AC   7D 00061        MOVQ    STACK_TOP, -(SP)                                        ;
                                       53   DD 00065        PUSHL   R3                                                      ;
```

```
                                04   AC  DD 00067          PUSHL   VALBUFFER                                    ;
                           51        52  D0 0006A          MOVL    R2, R1                                      ;
                      08   BC        04  FB 0006D          CALLS   #4, @ROUT_ADDR                              ;
                                     04  00071            RET                                                 ;
                           7E   14   AC  7D 00072  5$:      MOVQ    STACK_TOP, -(SP)                            ; 9044
                                     53  DD 00076          PUSHL   R3                                          ;
                           51        52  D0 00078          MOVL    R2, R1                                      ;
                      08   BC        03  FB 0007B          CALLS   #3, @ROUT_ADDR                              ;
                      04   BC        50  D0 0007F  6$:      MOVL    R0, @VALBUFFER                              ;
                                     04  00083            RET                                                 ; 9048
                                0000 00084  7$:      .WORD   Save nothing                                        ; 8991
                                7E   D4  00086          CLRL    -(SP)                                       ;
                                5E   DD  00088          PUSHL   SP                                          ;
                           7E        04  AC  7D 0008A          MOVQ    4(AP), -(SP)                                ;
                     0000V CF        03  FB 0008E          CALLS   #3, VALSPEC_ROUT_CALL_HANDLER               ;
                                     04  00093            RET                                                 ;

; Routine Size:  148 bytes,    Routine Base:  DBG$CODE + 3ACF
```

```
;  8967          9049  1 ROUTINE VALSPEC_ROUT_CALL_HANDLER(SIGARG, MECHARG, ENBLARG) =
;  8968          9050  1 !
;  8969          9051  1 ! FUNCTION
;  8970          9052  1 !       This routine is the error handler for the VALSPEC_ROUT_CALL routine.  It
;  8971          9053  1 !       handles abnormal conditions which occur during the evaluation of
;  8972          9054  1 !       PLI Base Variable, ie. Pointer to the base variable has not been set
;  8973          9055  1 !       up by the ALLOCATE in PLI before the program execution.  However we
;  8974          9056  1 !       do allow symbol is not active signal to go through this routine.
;  8975          9057  1 !
;  8976          9058  1 ! INPUTS
;  8977          9059  1 !       SIGARG  - The signal argument vector.
;  8978          9060  1 !
;  8979          9061  1 !       MECHARG - The mechanism argument vector.
;  8980          9062  1 !
;  8981          9063  1 !       ENBLARG - The enable argument vector (not used here).
;  8982          9064  1 !
;  8983          9065  1 ! OUTPUTS
;  8984          9066  1 !       For the DBG$_SYMNOTACT error, this routine just resignal.
;  8985          9067  1 !       For all other errors, this routine signals DBG$_BASVARNOTSET.
;  8986          9068  1 !
;  8987          9069  1
;  8988          9070  2     BEGIN
;  8989          9071  2
;  8990          9072  2     MAP
;  8991          9073  2         SIGARG: REF VECTOR[,LONG];      ! Pointer to the signal argument vector
;  8992          9074  2
;  8993          9075  2
;  8994          9076  2     IF .SIGARG[1] EQL DBG$_SYMNOTACT OR
;  8995          9077  2        .SIGARG[1] EQL SS$_UNWIND
;  8996          9078  2     THEN
;  8997          9079  2         RETURN SS$_RESIGNAL;
;  8998          9080  2
;  8999          9081  2     SIGNAL(DBG$_BASVARNOTSET);
;  9000          9082  2     RETURN 0;
;  9001          9083  2
;  9002          9084  1     END;


                                        0000 00000 VALSPEC_ROUT_CALL_HANDLER:
                                                   .WORD   Save nothing                          ; 9049
                    50        04    AC  D0 00002           MOVL    SIGARG, R0                    ; 9076
00028C88            8F        04    A0  D1 00006           CMPL    4(R0), #167048
                                    0A  13 0000E           BEQL    1$
00000920            8F        04    A0  D1 00010           CMPL    4(R0), #2336                  ; 9077
                                    06  12 00018           BNEQ    2$
                    50      0918    8F  3C 0001A 1$:       MOVZWL  #2328, R0                     ; 9079
                                        04 0001F           RET
                        00028108    8F  DD 00020 2$:       PUSHL   #164104                       ; 9081
00000000G           00              01  FB 00026           CALLS   #1, LIB$SIGNAL
                                    50  D4 0002D           CLRL    R0                            ; 9082
                                        04 0002F           RET                                   ; 9084

; Routine Size:  48 bytes,    Routine Base:  DBG$CODE + 3B63
```

```
; 9003          9085  1
; 9004          9086  1
; 9005          9087  0 END ELUDOM


                                                        .EXTRN  LIB$SIGNAL, SYS$UNWIND

;                               PSECT SUMMARY
;
;       Name                    Bytes                           Attributes
;
;  DBG$OWN                        92  NOVEC,  WRT,  RD ,NOEXE,NOSHR,  LCL,  REL,  CON,  PIC,ALIGN(2)
;  DBG$PLIT                     2400  NOVEC,NOWRT,  RD ,  EXE,  SHR,  LCL,  REL,  CON,  PIC,ALIGN(0)
;  DBG$CODE                    15251  NOVEC,NOWRT,  RD ,  EXE,  SHR,  LCL,  REL,  CON,  PIC,ALIGN(0)


;                           Library Statistics
;
;                                    --------  Symbols  --------      Pages       Processing
;       File                         Total     Loaded   Percent      Mapped      Time
;
;  _$255$DUA28:[SYSLIB]LIB.L32;1      18619         20         0        1000       00:01.9
;  _$255$DUA28:[DEBUG.OBJ]STRUCDEF.L32;1
;                                        32          3         9           7       00:00.1
;  _$255$DUA28:[DEBUG.OBJ]DBGLIB.L32;1
;                                      1545        224        14          97       00:02.0
;  _$255$DUA28:[DEBUG.OBJ]DSTRECRDS.L32;1
;                                       418        233        55          31       00:00.3
;  _$255$DUA28:[DEBUG.OBJ]DBGMSG.L32;1
;                                       386         14         3          22       00:00.3
;  _$255$DUA28:[DEBUG.OBJ]DBGGEN.L32;1
;                                       150          1         0          12       00:00.3


;                                   COMMAND QUALIFIERS

;       BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/LIS=LIS$:RSTACCESS/OBJ=OBJ$:RSTACCESS MSRC$:RSTACCESS/UPDATE=(ENH$:RSTACCESS)

; Size:         15251 code + 2492 data bytes
; Run Time:         04:32.7
; Elapsed Time:     05:19.3
; Lines/CPU Min:     1999
; Lexemes/CPU-Min: 15128
; Memory Used:  876 pages
; Compilation Complete
```

0098 AH-BT13A-SE
VAX/VMS V4.0

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RSTACCESS
LIS

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